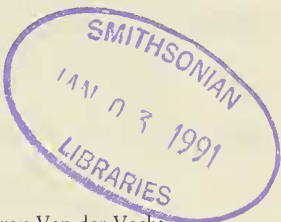


REVISION OF THE SUBGENUS *PROSCELIPHRON* VAN DER VECHT (HYMENOPTERA, SPHECIDAE)

BY

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ABSTRACT

This paper deals with the species belonging to the subgenus *Prosceliphron* Van der Vecht, 1968 (Hymenoptera, Sphecidae: *Sceliphron* Klug). Eleven species are recognized, and ten additional subspecies. The status of eight taxa is changed in comparison to the lists of Bohart and Menke (1976). Three new subspecies are described: *S. deforme femorale*, *S. rufopictum kalshoveni*, and *S. rufopictum laticinctum*. Lectotypes are designated for twelve species-group names. The revision comprises keys to the species and subspecies, descriptions of all taxa, maps of the distribution, and a phylogenetic analysis of characters, resulting in a cladogram.

CONTENTS

Introduction 217
Biology 218
The subgenus *Prosceliphron* Van der Vecht 218
Phylogeny 219
Key to the species of the subgenus *Prosceliphron* Van der Vecht 222
References 259
Index 261

INTRODUCTION

This paper is the second part of the “Studies in the *Sceliphronini*” which was started in 1968 with the “Revision of the nominate subgenus *Sceliphron* Latreille (recte: Klug) (Hymenoptera, Sphecidae)” by Van der Vecht & Van Breugel. The present paper deals with the subgenus *Prosceliphron* Van der Vecht, and thus completes the revision of the genus *Sceliphron*. I have based my work to some extent on material gathered by Dr Van der Vecht, during and after his work on *Sceliphron* s.s., and I have taken advantage of his personal notes on the species and subspecific forms.

Terminology. — I generally have applied the morphological terminology of Bohart and Menke (1976), which is the same as that used in the revision of the nominate subgenus. However, I have replaced the terms “thorax” by “mesosoma”, and “abdomen” by “metasoma”, following Michener (1944) and many other workers on Hymenoptera in this respect. For the description of surface sculpture the terminology of Eady (1968) has been followed.

Two structures of morphological importance appeared not to be named yet. The “post-antennal tubercles” are elevations on the frons, just above the antennal insertions, which vary in shape and size. The “volsellar plate” is a median plate-like structure in the genitalia of the male, attached ventrally at the bases of the volsellae. The fact that the taxonomic importance of this structure has never received much attention is probably due to the common practice of illustrating only one half of the genital apparatus.

With regard to colour-patterns I have considered it unnecessary to give lengthy descriptions of all taxa, since Kohl’s work (1918) is rather complete in this respect; full descriptions are therefore only given for taxa which are not mentioned in Kohl’s work.

In order to give some of the specific characters a more exact basis, I have found it useful to express these in a number of ratios. Certain body measurements were made on a selection of specimens of each species, including the extremes as far as possible. The ratios are defined and abbreviated as follows.

- IFR Interocular distance across the vertex, divided by the length of the first flagellomere.
- PTR Length of the petiolus (b in fig. 1), divided by the length of the hind tibia.
- PR Petiolus ratio, see fig. 1: a divided by b.
- TR Tergite ratio, see fig. 1: c divided by d.
- SR Segment ratio, see fig. 1: d divided by b.

The material used for this study is for the most part preserved in the collections of the following museums:

BPBM	Bernice P. Bishop Museum, Honolulu, Hawaii, USA
BMNH	British Museum (Natural History), London, England
CH	Collection Hensen, Utrecht, The Netherlands
DEI	Former Deutsche Entomologische Institut, now Institut für Pflanzen-schutzforschung, Eberswalde, GDR
IRSN	Institut Royal de Sciences Naturelles, Brussels, Belgium
LACM	Los Angeles County Museum, Los Angeles, Calif., USA
TMA	Természettudományi Múzeum, Budapest, Hungary
MCZ	Museum of Comparative Zoology, Cambridge, Mass., USA
RMNH	Rijksmuseum van Natuurlijke Historie, Leiden, The Netherlands
MNHN	Musée National d'Histoire Naturelle, Paris, France
MZU	Museo di Zoologia della Università, Torino, Italy
NMW	Naturhistorisches Museum Wien, Vienna, Austria
NRS	Naturhistoriska Riksmuseet, Stockholm, Sweden
OUM	Oxford University Museum, Oxford, England
USNM	United States National Museum, Washington D.C., USA
UZM	Universitetets Zoologiske Museum, Copenhagen, Denmark
ZIL	Zoologitseskij Institut, Leningrad, USSR
ZMA	Zoologisch Museum, Amsterdam, The Netherlands
ZMB	Zoologisches Museum der Humboldt-Universität, Berlin, GDR.

I am greatly indebted to the curators of these museums, for enabling me to study the material in their care.

I especially wish to thank Dr J. van der Vecht, Putten, and Dr C. van Achterberg, Leiden, for their helpful criticism and valuable remarks, and for the final reviewing of the manuscript; and Dr E. McC. Callan, Canberra, for his permission to publish some of his observations on *S. formosum*.

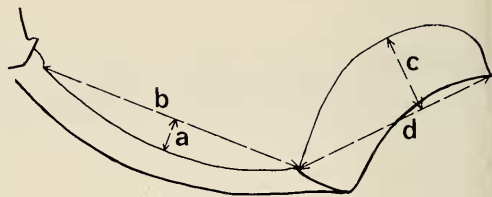


Fig. 1. *Sceliphron deformе* (Smith), first metasomal segment, lateral aspect.

BIOLOGY

As discussed by Van der Vecht (1961: 254), biologically, the species of *Prosceliphron* are separated from those of *Sceliphron* s.s. in the way in which they construct their nest. *Sceliphron* s.s. species build their cells against each other, and the whole nest is covered with an extra layer of mud after completion. *Prosceliphron*-species build the cells close to each other, but they remain free, and are not covered by an extra layer of mud. This behaviour has been reported up to now for the following species: *S. rectum* Kohl, *S. curvatum* (Smith), *S. deformе* (Smith), *S. coromandelicum* (Lepeletier) and *S. rufopictum* (Smith). Dr E. McC. Callan, Canberra, Australia (pers. comm.) confirmed this type of behaviour in *S. formosum* (Smith): "The nest was built in a sheltered situation in the garage of my house in Canberra. It comprised five free mud-cells, amphora-shaped, and with a smooth surface, and was not covered by an extra layer of mud (crépissage) applied after completion of the cells. Provisioning was almost exclusively with spiders of the family Salticidae".

THE SUBGENUS *PROSCELIPHRON* VAN DER VECHT

Prosceliphron Van der Vecht, 1968: 192, as subgenus of *Sceliphron* Klug.

Type species: *Sceliphron coromandelicum* (Lepeletier, 1845), by original designation.

The following description is an addition to the generic description by Bohart & Menke (1976: 103–104).

Head. — Lower three-fifths of inner orbits parallel; clypeus of female with a pair of lobes apically, which are continuous with the lateral margin, or separated from it by an angle or incision; clypeus of male with a pair of small apical

Table 1. Synoptic table of character-states in the species of the subgenus *Prosceliphron* Van der Vecht.

Plesiomorphous character-states (0)	Sceliphron s.s.												Apomorphous character-states (●)
	shestakovi	funestum	rectum	curvatum	deforme	fervens	coromandelicum	rufopictum	murarium	unifasciatum	formosum		
1) Hypostomal carina complete	0	0	●	●	●	●	●	●	●	●	●	Hypostomal carina reduced	
2) Clypeal lobes not differentiated	0	0	0	0	●	●	●'	●'	●'	●'	●'	Clypeal lobes differentiated (●) Clypeus with lateral incisions (●')	
3) First tergite slender	0	0	0	0	●	●	●	0	0	0	0	First tergite swollen	
4) Clypeus of male laterally emarginate	0	0	●	●	0	0	0	●	●	●	●	Clypeus of male laterally rounded	
5) Dorsal margin of propodeal orifice narrow	0	0	0	0	0	0	0	●	●	●	●	Dorsal margin of propodeal orifice raised	
6) Vertex simple	0	0	0	0	0	0	0	●	0	0	●	Vertex with tendency to elevation	
7) Volsellar plate narrow, oblong	0	?	0	0	●	●	●	●'	●'	?	●	Volsellar plate small (●) Volsellar plate triangular (●')	
8) Cuspis pubescent	0	?	●	●	0	0	0	0	0	?	0	Cuspis without pubescens	

lobes, or rounded and medially incised; mandible unidentate; hypostomal carina usually reduced, evanescent about half-way to mandible, but complete in *shestakovi*.

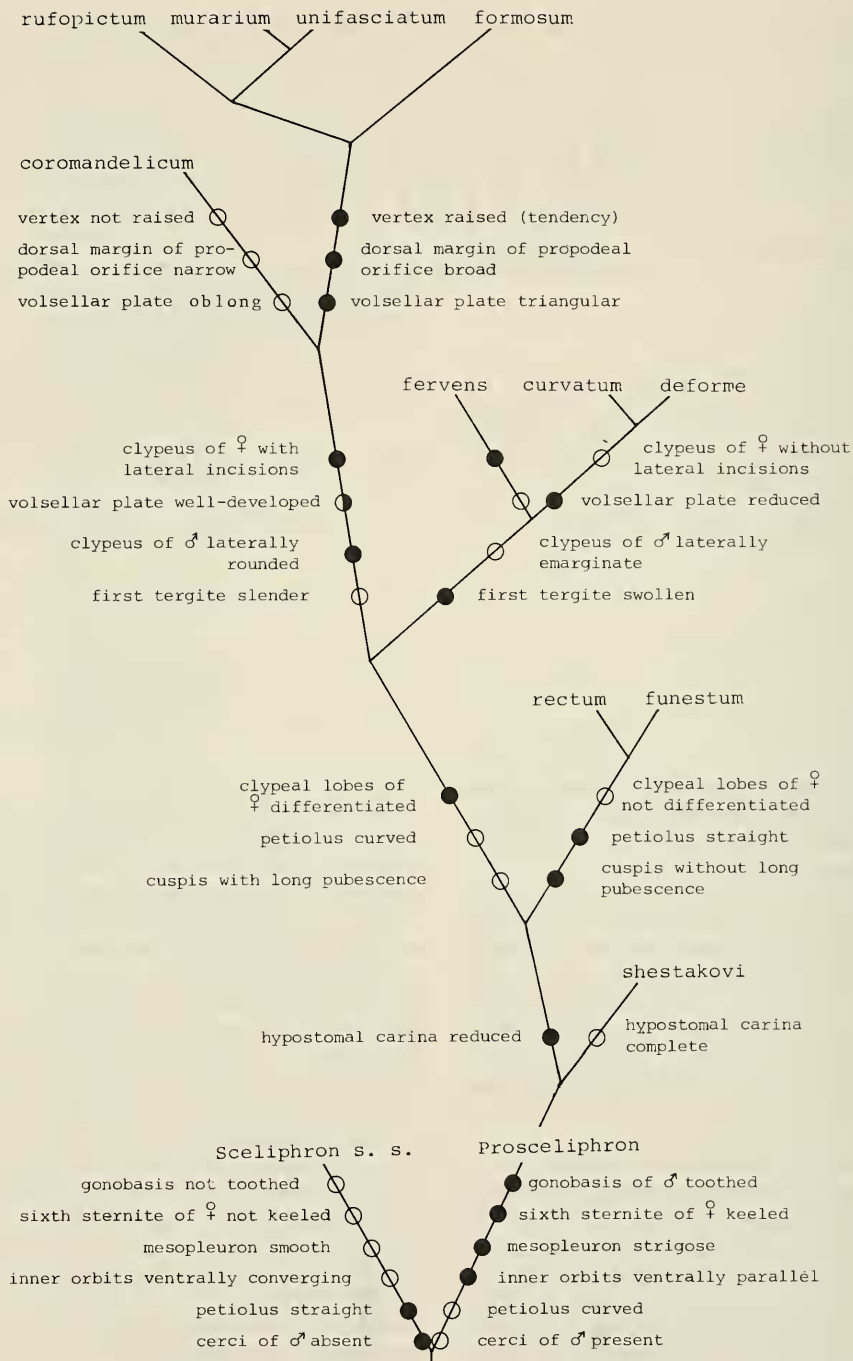
Mesosoma. — Mesoscutum transversely striate to strigose; scutellum longitudinally strigose, striae more or less evanescent anteriorly; mesopleuron strongly sculptured: strigose and punctate or granulate; scrobal sulcus indicated; metapleural sulcus present; metapleuron with variable sculpture; claws of middle and hind legs, and usually those of fore legs with small mesal tooth; propodeum transversely strigose and more or less punctate.

Metasoma. — Petiolus curved, except in *funestum* and *rectum*; sixth sternite of female keeled; male with feebly developed bands of micro-pubesence on fifth and sixth sternite; penis valves ventrally with a row of 10–20 teeth on the inner margin; aedeagus apically rounded; cuspis densely punctate and with long setae, except in *rectum* and *funestum*; head of digitus rounded; gonobasis with more or less distinct tooth ventrally.

PHYLOGENY

For the phylogenetic analysis of the genus *Sceliphron* Klug, I have considered *Chalybion* Dahlbom to be its sister-group and consequently the most useful outgroup. The morphological evidence for the sister-group relationship between these genera is rather weak, as pointed out by Bohart & Menke (1976: 83). There are no strict autapomorphies separating the two genera from the remaining Sceliphronini. However, there is a strong biological argument, i.e. the type of prey these genera use. *Sceliphron* and *Chalybion* prey exclusively on spiders, whereas all other Sceliphronini prey on Orthoptera and Dictyoptera. The use of spiders is very rare within the Sphecidae, whereas Orthoptera are a common prey of many Sphecid tribes, including the Sphecini. Thus preying on spiders can be regarded as a synapomorphy of *Sceliphron* + *Chalybion*.

Within this assemblage, *Sceliphron* can be considered a monophyletic group on basis of the following synapomorphies, determined by reference to the other genera of the Sceliphroni-

Fig. 2. Cladogram of the species of the subgenus *Prosceliphron* Van der Vecht.

ni. The corresponding plesiomorphous character-states, found in the other Sceliphronini, including *Chalybion*, are given between brackets.

1. Clypeus ventrally untoothed, with broad, flat margin. (Clypeus toothed, without flat margin.)

2. Integument partly bright yellow, particularly the legs and petiolus, usually also part of meso- and metasoma. (Integument black or metallic blue, not partly yellow.)

Within the genus *Sceliphron*, two subgenera can be recognized on basis of the following characters. The plesiomorphous character-state, determined by reference to the outgroup *Chalybion*, is given between brackets.

1. Inner orbits of female essentially straight on lower three-fifth. (Inner orbits ventrally converging.)

2. Mesopleuron strigose, dull. (Mesopleuron punctate, shiny.)

3. Petiolus long and essentially straight. (Petiolus short, curved.)

4. Sixth sternite of female longitudinally keeled. (Sixth sternite of female convex or flat, not keeled.)

5. Eighth tergite of male without cerci. (Eighth tergite of male with cerci.)

6. Gonobasis of male apico-ventrally with a small tooth. (Gonobasis of male untoothed.)

The subgenus *Sceliphron* s.s. has the apomorphous character-states of 3 and 5. The subgenus *Prosceliphron* has the apomorphous character-states of 1, 2, 4 and 6.

The following characters are of taxonomic importance within the subgenus *Prosceliphron*, at the species-level. The plesiomorphous character-states, determined by reference to the outgroup, the sister-group *Sceliphron* s.s., are given between brackets, if the interpretation is unambiguous.

1. Hypostomal carina reduced, ending about half way between the top of the hypostomal cavity and the base of the mandible. (Hypostomal carina complete, ending near base of mandible.)

2. The clypeus of the female. A sequence of three character-states can be recognized; the second state is morphologically a distinct intermediate between the other two. The polarity of the transformation-series however is doubtful.

All three character-states occur in *Sceliphron* s.s. as well:

i) Apical lobes not differentiated from the lateral parts of the free clypeal margin (fig. 4).

ii) Apical lobes differentiated, making an obtuse angle with the rest of the clypeal margin (fig. 33).

iii) Apical lobes separated from the rest of the clypeal margin by lateral incisions (fig. 65).

3. First metasomal tergite swollen (fig. 55). (First metasomal tergite slender.)

4. Ventral clypeal margin of male laterally rounded (fig. 71). (Ventral clypeal margin of male laterally emarginate (fig. 66).)

5. Dorsal margin of propodeal orifice raised into a lamella, trapezoid or rounded in posterior view (fig. 91). (Dorsal margin of propodeal orifice narrow, rounded (fig. 6).)

6. Vertex strongly raised behind anterior ocellus (fig. 100). (Vertex not raised.)

7. i) Volsellar plate reduced (fig. 20). ii) Volsellar plate broadly triangular (fig. 87). (Volsellar plate well-developed, oblong, pointed (fig. 53).)

8. Cuspis without pubescence. (Cuspis with rather long pubescence.)

The distribution of the plesio- and apomorphous character-states among the species is shown in the synoptic table (table 1).

The polarity of the transformation-series in character 2 has been determined by reference to others, in particular the first character. This one seems to be fairly strong: reduction of the hypostomal carina is a unique development within the Sceliphronini. On basis of this character, *S. shestakovi* can be regarded as the sister-group of the remaining species of *Prosceliphron*.

On basis of the data-matrix, the most parsimonious cladogram has been constructed, which is depicted in fig. 2. The four species on the top row have been ordered more or less phenetically, as they show no formal synapomorphies. These species are allopatric, insular taxa from the Indo-Australian area, and may have arisen by rapid, contemporary speciation. In that case it is not astonishing that no synapomorphies could be traced.

The place of *S. fervens* in the cladogram is rather doubtful. In the cladogram of fig. 2 it is placed as the sister-species of *S. curvatum* + *S. deforme*, assuming that homoplasy is present with respect to character 2, the shape of the clypeus of the female, and that character 3, the

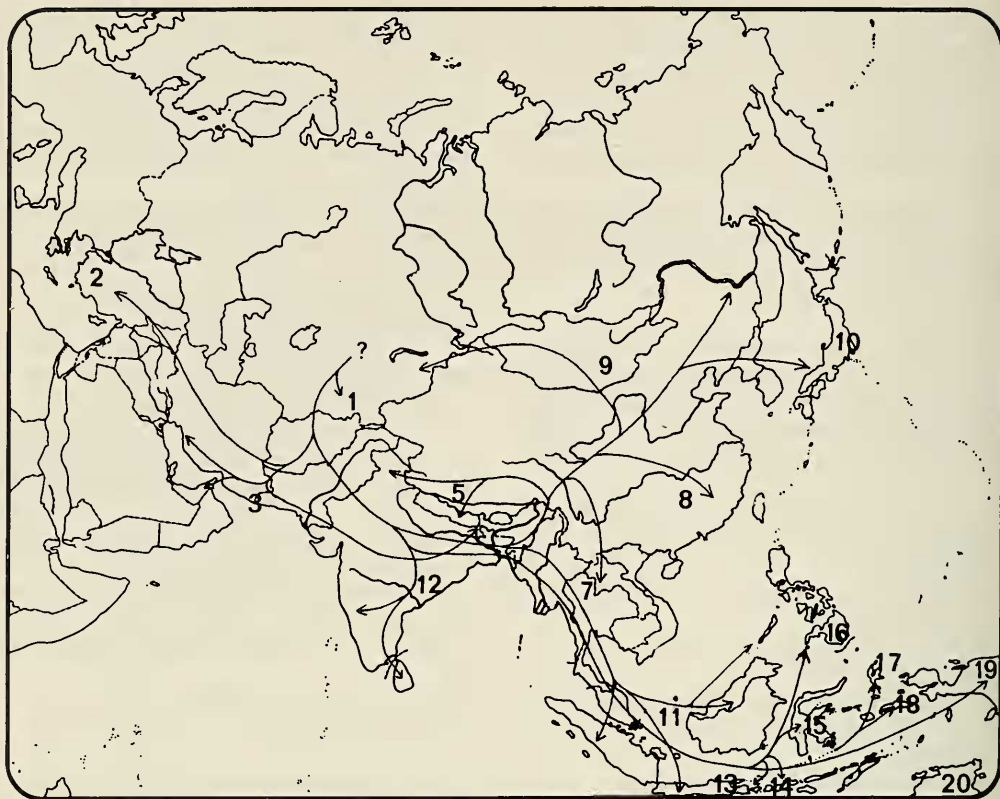


Fig. 3. Hypothetical evolutionary migration of *Prosceliphron* Van der Vecht; the present distribution is indicated by numbers which refer to recent species and subspecies (see figs. 114—118).

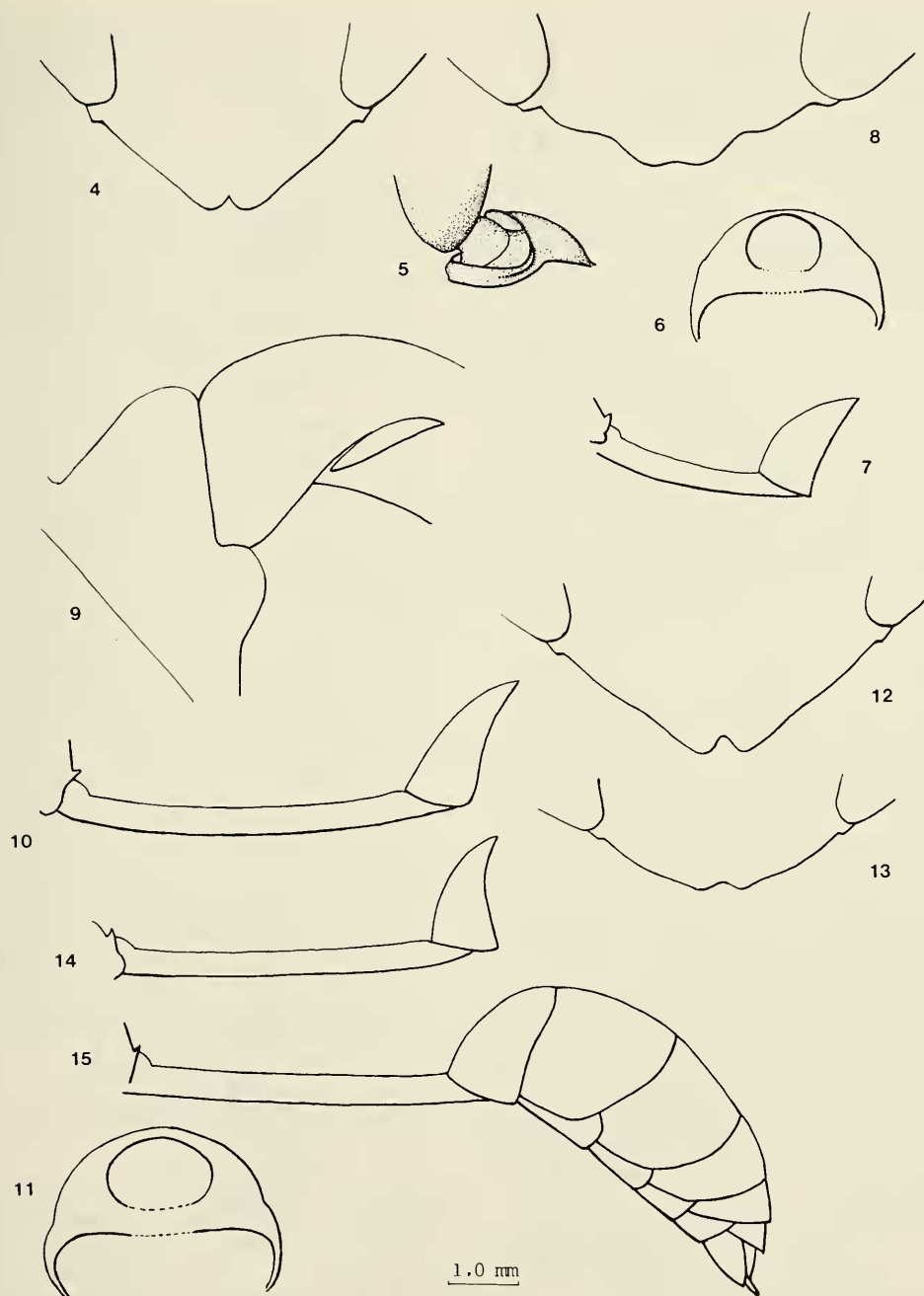
swollen first tergite, is a true synapomorphy.

The resulting cladogram is strongly correlated to the current geographic distribution of the species. Species at the base of the cladogram occur in Central and South-Western Asia, while species at the top of the cladogram are found in the Indo-Australian area. Apparently, the zoogeographic history of *Prosceliphron* is a case to which Hennig's progression rule (Wiley, 1981: 288) applies. Under these particular circumstances, it is possible to hypothesize about the migratorial routes the subgenus has followed in the course of its evolution. One of the probable pathways is shown in fig. 3. Obviously, the subgenus has originated in Central Asia, where nowadays *S. shestakovi*, sister-species of the remaining *Prosceliphron* still occurs. Spreading over South and East Asia supposedly took place via the Indian subcontinent. Two lineages of species arrived independently in the Indonesian archipelago, via the Malayan peninsula. The lineage originating from a *S. coromandelicum*-

like ancestor spread over large parts of the archipelago, and reached the Philippines via Celebes, and Australia via New Guinea. A second group probably arrived subsequently, spread over Sumatra and Java, and reached the Southern Philippine island Palawan via Borneo.

KEY TO THE SPECIES OF THE SUBGENUS *PROSCELIPHON* VAN DER VECHT

1. Petiolus in lateral view nearly straight (PR 0.02—0.04), usually longer than hind tibia (PTR ♀ 0.9—1.1; ♂ about 1.1), and apically compressed, about 1.5 times as high as broad (figs. 10, 14, 15); clypeus of ♀ without distinct terminal lobes (fig. 12) 2
- Petiolus in lateral view distinctly curved (PR 0.05—0.14), usually shorter (PTR ♀ 0.6—1.0; ♂ 0.8—1.1) and apically not compressed, as high as wide (e.g. figs. 27, 28); clypeus of ♀ variable 3
2. Mesosoma with extensive yellow markings:



Figs. 4—15. 4—8. *Sceliphron shestakovi* Gussakovskij. 4—7, ♀, USSR, Tadzhikistan. 4, clypeus; 5, antennal insertion; 6, propodeal orifice; 7, first metasomal segment. 8, ♂, USSR, Kirgizia, clypeus. 9—11, *Sceliphron funestum* Kohl. 9, ♀, Greece, pronotum, lateral aspect; 10, ♂, Greece, first metasomal segment; 11, ♀, Turkey, propodeal orifice. 12—15, *Sceliphron rectum* Kohl. 12, ♀, India, Gujarat, clypeus; 13—14, ♂, India, Gujarat, 13, clypeus, 14, first metasomal segment; 15, ♀, Pakistan, metasoma, lateral aspect. 4, 7, 8, 10, 12—15: scale-line; 9: 2.0 × scale-line; 5, 6, 11: 4.0 × scale-line.

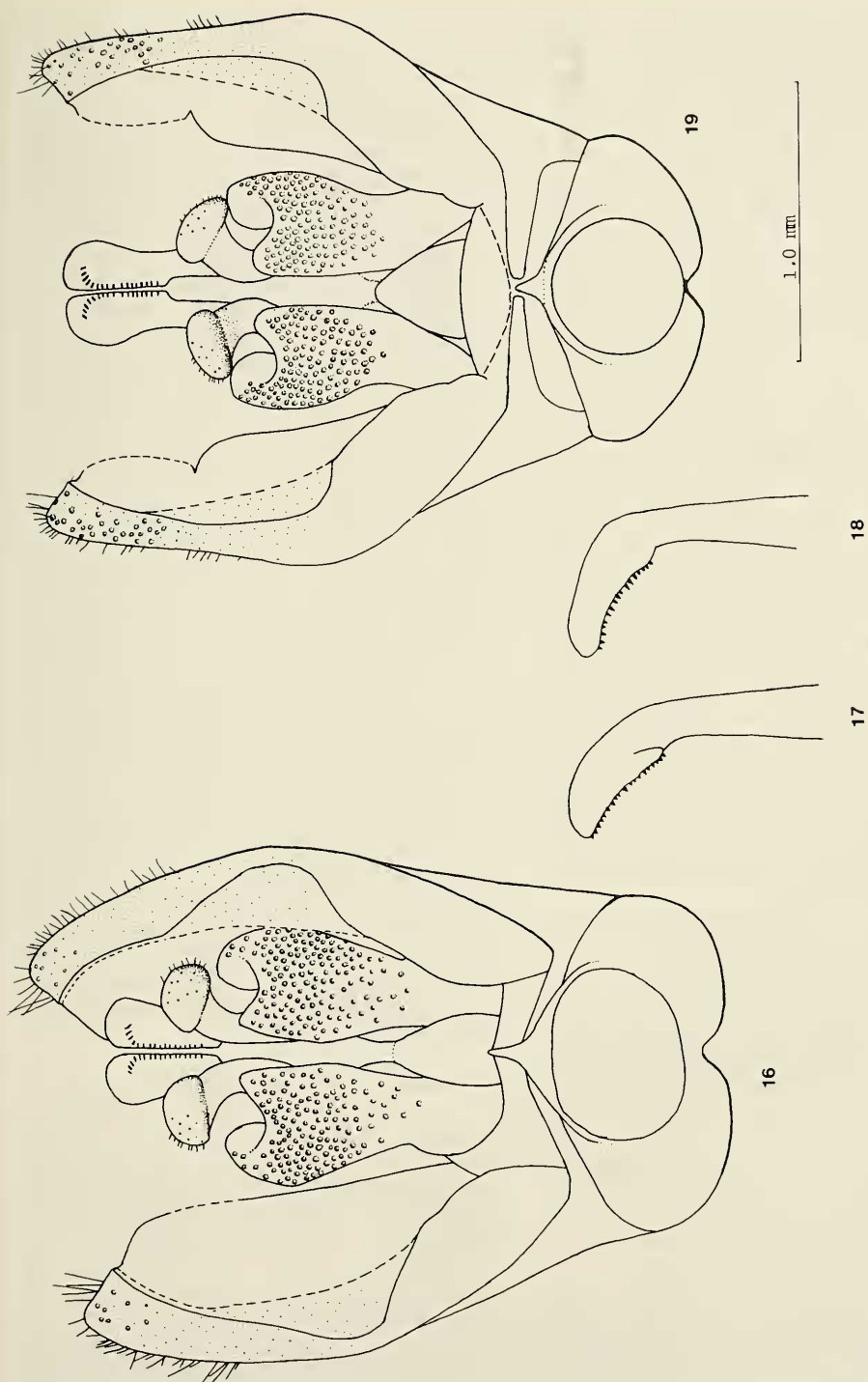
- at least with bands on pronotum and scutellum and large spots on the mesopleuron; petiolus yellow; Iran to India *rectum* Kohl (p. 228)
- Mesosoma nearly entirely black; petiolus black; Greece, Turkey *funestum* Kohl (p. 226)
3. Hypostomal carina runs to base of mandibles; metapleuron finely granulate; petiolus very short (PTR ♀ 0.6—0.7; ♂ 0.8), mainly yellow; all tergites with yellow band; Tadzhikistan and adjacent Soviet Republics *shestakovi* Gussakovskij (p. 224)
- Hypostomal carina does not reach base of mandibles; metapleuron punctate or strigose; petiolus longer (PTR ♀ 0.7—1.0; ♂ 0.8—1.1); coloration variable 4
4. Mesoscutum dull, irregularly strigose, and with distinct shallow punctation between the striae over its entire surface 5
- Mesoscutum comparatively shiny, regularly striate and only laterally and along the admedian line sometimes shallowly punctate 6
5. Interocular distance at vertex distinctly longer than first flagellomere (IFR ♀ 1.1—1.2; ♂ 1.1—1.2); fore claws untoothed; clypeus of ♀ without lateral incisions (fig. 25); clypeus of ♂ laterally emarginate (fig. 22); Tadzhikistan to Nepal, Austria *curvatum* (Smith) (p. 228)
- Interocular distance shorter (IFR ♀ 0.9—1.1; ♂ 0.9—1.1); fore claws toothed; clypeus of ♀ with lateral incisions (figs. 103, 104); clypeus of ♂ laterally rounded (figs. 105, 106); Australia, New Guinea, Bismarck-Archipelago, Solomon-Islands *formosum* (Smith) (p. 255)
6. Petiolus yellow, rest of metasoma black; mesosoma nearly entirely black; India to Malaya *coromandelicum* (Lepelletier) (p. 243)
- Petiolus entirely or for the most part black; mesosoma usually with extensive yellow markings 7
7. First tergite swollen (TR ♀ 0.22—0.36; ♂ 0.25—0.38) (figs. 36—39); upper margin of propodeal orifice narrow and rounded (figs. 24, 51), usually not translucent 8
- First tergite not swollen (TR ♀ 0.13—0.22; ♂ 0.17—0.18) (figs. 76, 78, 80); upper margin of propodeal orifice strongly developed: broad, lamelliform, rounded (fig. 77) or trapezoid (fig. 79), often yellowish or brownish translucent 9
8. Forewing at apex with well defined dark spot; only third metasomal tergite with complete yellow band; lower part of subtegular spot, if present, smaller than upper part; clypeus of ♀ with lateral incisions (fig. 49); Southern Thailand to Java, Borneo, Palawan *fervens* (Smith) (p. 242)
- Forewing at apex with comparatively ill-defined dark spot; at least fourth and fifth tergite with complete band, or metasoma unbanded; lower part of subtegular spot, if present, larger than upper part; clypeus of ♀ without lateral incisions (figs. 33, 34); Kazakhstan to Japan and Indochina *deforme* (Smith) (p. 230)
9. Pubescence of head and mesosoma dark brown; meso- and metasoma without yellow markings; first and second tergites entirely reddish; Ceram, Ambon *murarium* (Smith) (p. 254)
- Pubescence of head and mesosoma white or slightly yellowish; metasoma entirely black, without red, or with yellow bands 10
10. Mesosoma with extensive yellow markings on pronotum, mesopleuron, scutellum and propodeum (figs. 81—84); pronotal collar comparatively broad in lateral view (figs. 74, 75); Philippines, Celebes, Java and smaller Sunda Islands *rufopictum* (Smith) (p. 247)
- Mesosoma with at most small spots on subalar area and faint bands on pronotum and scutellum; (fig. 85); pronotal collar comparatively high and narrow in lateral view (fig. 94); Northern Moluccas *unifasciatum* (Smith) (p. 254)

Sceliphron shestakovi Gussakovskij
(figs. 4—8, 114)

Sceliphron (*Pelopoens*) *shestakovi* Gussakovskij, 1928: 4, ♀ — Transcaspia (ZIL; examined).
Sceliphron (*Prosceliphron*) *shestakovi*; Bohart & Menke, 1976: 106.

Type. — The type-specimen I have seen is labelled "Merv, 12.VI.1925, V. Gussakovskij", "*Sceliphron shestakovi* m. sp. typicum unicum, V. Gussakovskij". It has been labelled as the lectotype, but evidently, it is the holotype. The type-locality Merv (= Mary) is situated in the Turkmen SSR, at 37°42' N, 61°54' E.

Description. — Body length: ♀ 12.9—15.0 mm, ♂ 16.9 mm; length of forewing: ♀ 8.7—9.6 mm, ♂ 10.4 mm. Erect pubescence of head



Figs. 16—19. 16—17. *Sceliphron funestum* Kohl, ♂, Greece. 16, genitalia, ventral aspect; 17, inner side of left half of aedeagus. 18—19, *Sceliphron rectum* Kohl, ♂, India, Gujarat. 18, inner side of left half of aedeagus; 19, genitalia, ventral aspect.

and mesosoma white, tomentum of face silvery.

Morphology: Female. — Clypeus without well-differentiated lobes (fig. 4); post-antennal tubercles distinct (fig. 5); hypostomal carina runs to base of mandibles, like in *Sceliphron* s.s.; pronotum with median impression; mesoscutum sharply transversely striate, without punctation, finely granulate between the striae; metapleuron finely granulate; scutellum smooth on anterior two-thirds; propodeal orifice rounded, with very narrow dorsal margin (fig. 6); petiolus short, moderately curved, first tergite not swollen (fig. 7); IFR 1.16—1.18; PTR 0.62—0.69; PR 0.08—0.09; TR 0.20—0.24; SR 0.90—1.09. Male. — Like the female, but clypeus laterally emarginate, and with the apical lobes more or less fused (fig. 8); petiolus longer. IFR unknown; PTR 0.79; PR 0.091; TR 0.16; SR 0.86.

Coloration: Black; the following parts are bright yellow: rectangular spot on clypeus, scape ventrally, bands on pronotum and scutellum, spots on tegula, on mesopleuron below tegula, near basis of propodeum and near apex of dorsal enclosure, a large mark near apex of propodeum; legs yellow, except coxae, trochanters, basal half of femora and basal half of posterior tibiae, apical tarsomeres infuscated; petiolus yellow, basal half ventrally and laterally black, apical half with lateral black lines; first tergite yellow with antero-median dark patch, following tergites with broad yellow bands, sternites with lateral spots, those on fifth and sixth sternite almost coalescent; wings yellowish hyaline.

Distribution. — Southern USSR: Tadzhikistan, Kirgizia, Turkmenistan (fig. 114)

Material examined. — Tadzhik SSR. — 1 ♀, Kondara (35 km N. Dushanbe), 8 July 1979, W. J. Pulawski (USNM); 1 ♀, Kondara, Varzoba, 1100 m, July 1937, Gussakovskij (USNM); 1 ♀, Aman Kuta, 6 July 1932, V. Gussakovskij (ZIL).

Kirgiz SSR. — 1 ♀, Tashkent, 17 June 1930, G. Kuzan (ZIL).

Sceliphron funestum Kohl (figs. 9—11, 16, 17, 114)

Sceliphron funestum Kohl, 1918: 121, ♀ — Izmir, Turkey (NMW; not examined).

Sceliphron (Prosceliphron) funestum; Bohart & Menke, 1976: 106.

Description. — Body length: ♀ 17.6—21.1 mm, ♂ 18.7 mm; length of forewing: ♀ 11.2—12.9 mm, ♂ 12.0 mm. Pubescence white, tomentum of face silvery.

Morphology: Female. — Head broad, the eyes distinctly swollen; clypeus without distinctly differentiated lobes (cf. fig. 12); pronotal collar in lateral view longer and lower than in other *Prosceliphron* (fig. 9), dorsally with median impression; mesoscutum strongly transversely striate, scutellum longitudinally striate, striae anteriorly not evanescent; scutellum with shallow median impression; integument of head and mesosoma comparatively dull, strongly granulate; claws of fore legs untoothed; dorsal margin of propodeal orifice narrow and rounded (fig. 11); petiolus nearly straight and about as long as the hind tibia, posteriorly compressed, 1.5 times as high as broad, first tergite short and slender (cf. fig. 15); IFR 0.84—0.86; PTR 0.99—1.06; PR 0.02—0.03; TR 0.15—0.16; SR 0.48—0.50. Male. — Like the female, but clypeus with ventral margin rounded, medially shallowly emarginate (cf. fig. 13); petiolus longer and somewhat curved (fig. 10); genitalia (fig. 16, 17): gonobasis with well-developed tooth, gonostyles with rather inconspicuous lamellae, volsellar plate narrow, oblong, cuspis without long hairs (for differences between *S. funestum* and *S. rectum*, see under the latter). IFR 0.85; PTR 1.0; PR 0.04; SR 0.48.

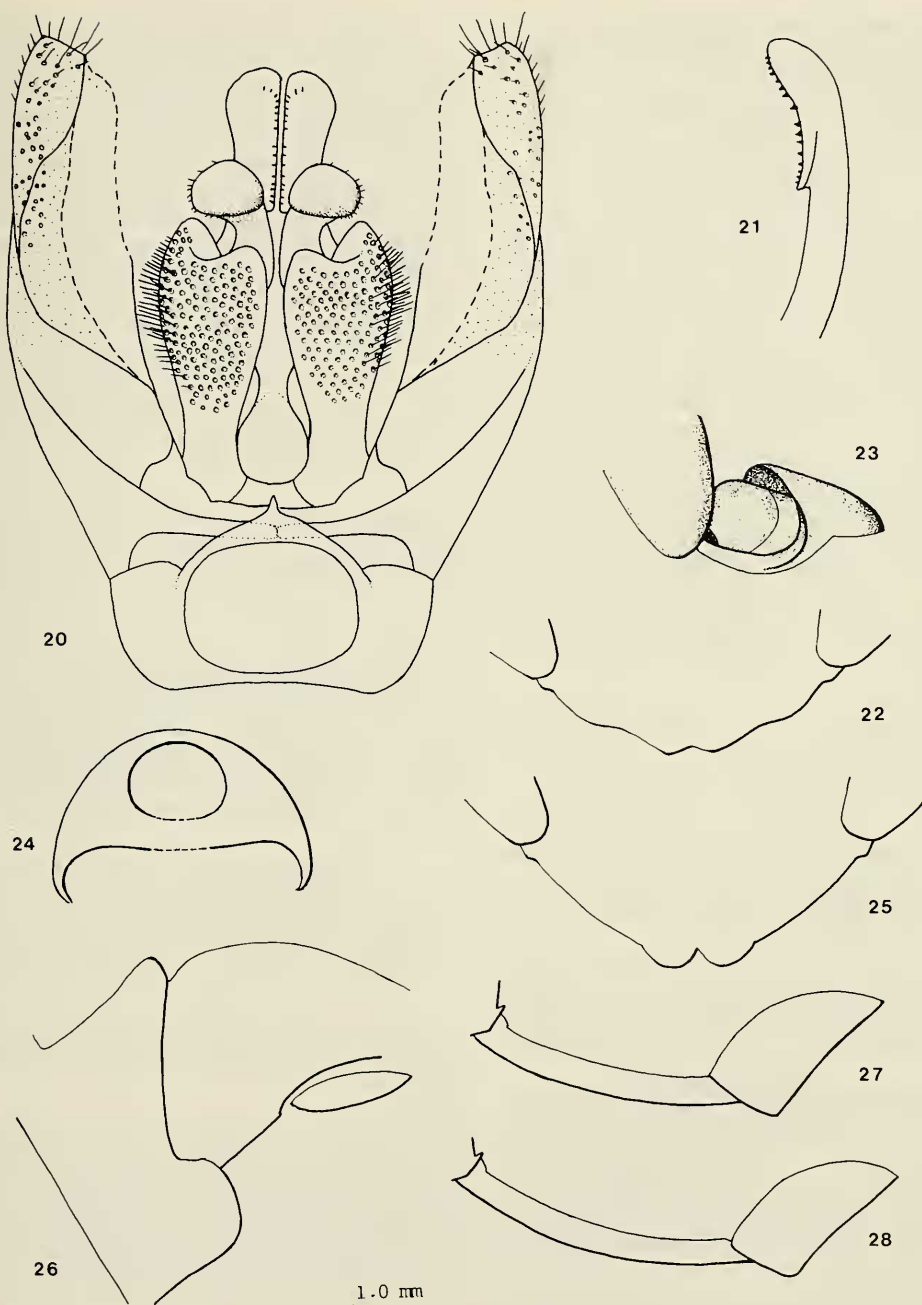
Coloration: Black; the following parts are yellow: ventral half of scape, spot on tegula, apex of fore and middle femora, apex of fore and middle tibiae (scutellum with transverse spot in a male from Rhodes); fuscous: third flagellomere, anterior sides of fore and middle tibiae (black in specimens from Crete). Wings light greyish hyaline, apex of forewing darkened.

Distribution. — Greece, Turkey (fig. 114).

Material examined. — Turkey. — 1 ♀, Reshadieh, Sept. 1929, Harry Stiner (USNM); 1 ♀, Icel, Silifke-Sapakili, July 1963, 300 ft., E. James (BMNH); 1 ♀, Silifke 35 km NNW, Kargican, 200 m; 4 Aug. 1985, R. Hensen (CH).

Rhodes. — 4 ♀, Ixia, 1—4 Sep. 1962, P. M. F. Verhoeff (RMNH); 1 ♀ 1 ♂, near Lindhos, 21 Aug. 1975, Ph. Pronk (RMNH).

Crete. — 1 ♀, Chanea, 16—20 July 1942, K. Zimmermann (RMNH); 1 ♀, Chania, Samaria,



Figs. 20—28. *Sceliphron curvatum* (Smith). 20—22, ♂, Austria. 20, genitalia, ventral aspect; 21, inner side of left half of aedeagus; 22, clypeus. 23—24, ♀, India, Uttar Pradesh. 23, antennal insertion; 24, propodeal orifice. 25, ♀, India, Punjab, clypeus. 26—27, ♀, India. 26, pronotum, lateral aspect; 27, first metasomal segment. 28, ♂, India, Calcutta, first metasomal segment. 22, 25, 27, 28: scale-line; 26: 2.0 × scale-line; 23, 24: 4.0 × scale-line; 20, 21: 8.0 × scale-line.

29 July 1981, P. van Ooyen (coll. van Ooyen); 1 ♂, Messaraebene, Ampelusus, 3 July 1942, K. Zimmermann (RMNH).

Greece. — 1 ♀, Ilia, Olympia, 4—11 July 1979, M. C. Day (BMNH).

Sceliphron rectum Kohl
(figs. 12—15, 18, 19, 114)

Description. — Body length: ♀ 16.5—19.4 mm. ♂ 14.4—17.3 mm; length of forewing ♀ 11.6—12.3 mm, ♂ 9.3—11.4 mm. Pubescence: erect pubescence white, head densely, mesosoma sparsely covered with silvery tomentum.

Morphology: structurally *S. rectum* is practically identical to *S. funestum*; the difference in colour-pattern however is striking, and there are differences in the genitalia of the ♂ (fig. 18, 19): the volsellar plate is triangular, whereas in *S. funestum* it is oblong, and the aedeagus-head is, in lateral view, proximally broader than apically, whereas in *S. funestum* it is parallel-sided. ♀ — IFR 0.84—0.92; PTR 0.94—1.07; PR 0.015—0.02; TR 0.10—0.19; SR 0.48—0.54. ♂ — IFR 0.89—1.00; PTR 1.04—1.13; PR 0.01—0.02; TR 0.07—0.11; SR 0.32—0.42.

Distribution. — Iran, United Arab Emirates, Pakistan, India (fig. 114).

Key to the subspecies of *Sceliphron rectum* Kohl

1. Metanotum with yellow band, propodeum with extensive yellow markings, at least first tergite with yellow band, hind tibiae black; Iran to India *pulchellum* Gussakovskij
- Metanotum, propodeum and first tergite black; hind tibiae yellow on outer side; Sikhim *rectum* Kohl

Sceliphron rectum pulchellum Gussakovskij

Sceliphron bilineatum; Dutt, 1912: 221—223, figs. 10, 10a, 11 (W. India and Pusa; bionomics) (misidentification).

Sceliphron pulchellum Gussakovskij, 1933: 275, ♂ — Bushir, Iran (ZIL; examined).

Sceliphron (Prosceliphron) pulchellum; Bohart & Menke, 1976: 106.

Type. — According to the original description, the species was based on only one specimen, the holotype. It is labelled "Bushire, Persia", "*Sceliphron pulchellum*, sp. n., ♂, V. Gussakovskij", and "k. Gussakovskij".

Description. — Coloration: female (hitherto undescribed). — Black, the following parts yellow: small spot on clypeus, antennal scape and flagellomeres 1—4 ventrally, broad band on pronotum, scutellum and metanotum, spots on tegulae, large subtegular spots, propodeum with basal spots and very large terminal mark, which is confluent with a pair of spots in the dorsal enclosure; legs yellow except basal third of femora and hind tibiae; wings yellowish hyaline, apex of forewing darkened; petiolus and large transverse spot on first tergite yellow. Male. — Like the female, but with additional yellow spots on alle coxae, first tergite nearly entirely yellow, third to seventh tergite with yellow apical bands (in the Indian and Pakistani material the third and fourth tergite are black).

Material examined. — India. — 1 ♀ 2 ♂, Ahmedabad, bred from cell, 16 Aug. 1967, S. D. Jayakar (MNHN, RMNH); 1 ♀, Pachrukhi, Behar, 1927, Cornell U. Lot 753 (Cornell Univ., New York).

Pakistan. — 2 ♀, Kurrachee, Aug.—Sept., Maindron 133—96 (MNHN, RMNH).

United Arab Emirates. — 2 ♀ 13 ♂, Hatta, 23 Oct.—13 Nov. 1981; 1 ♀, Wadi Uyoynah, nr. Dibba, 7 Aug. 1981; 1 ♂, Masafi, 7 Aug. 1981, all C. D. Roche (coll. Roche, duplicates in BMNH, coll. Guichard, USNM, CH).

Sceliphron rectum rectum Kohl

Sceliphron rectum Kohl, 1918: 124—125, ♀, — Sikhim, India (ZMB; examined).

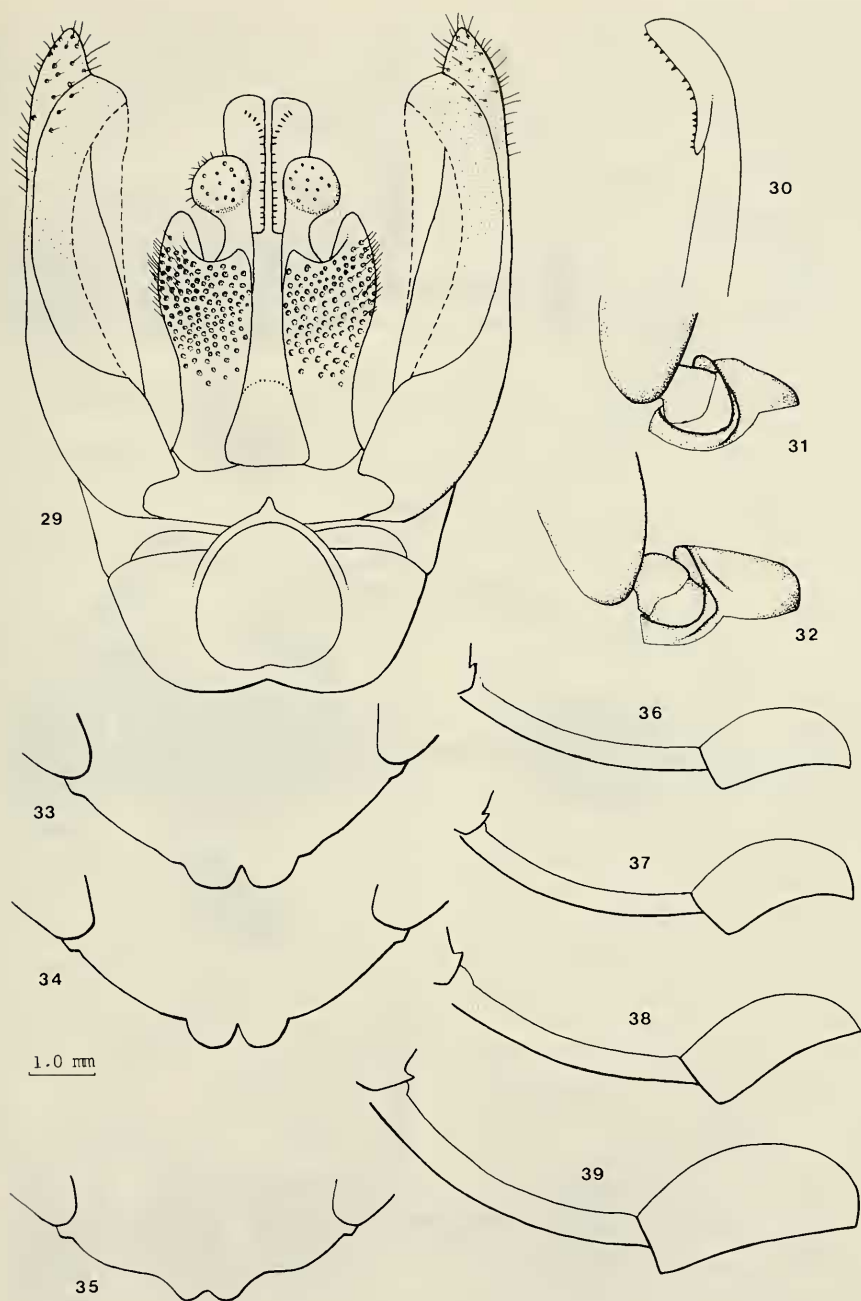
Sceliphron (Prosceliphron) rectum; Bohart & Menke, 1976: 106.

Type. — The holotype, and only known specimen of the subspecies, is labelled "Sikhim, coll. Bingham".

Description. — Differs only by coloration from the previous subspecies, the pattern was described in full detail by Kohl (1918); characteristic are the bands on the pronotum and scutellum, large subtegular spots, petiolus largely yellow, remainder of metasoma black, and propodeum black.

Sceliphron curvatum (Smith)
(figs. 20—28, 115)

Pelopoëus curvatus Smith, 1870: 187, ♂ (not ♀!) —



Figs. 29—39. *Sceliphron deformis* (Smith). 29—30, ♂, Japan. 29, genitalia, ventral aspect; 30, inner side of left half of aedeagus. 31, ♀, *S. d. deformis* (Smith), China, Tibet, antennal insertion. 32, ♀, *S. d. atripes* (Morawitz), USSR, Primori area, antennal insertion. 33—35, clypeus; 33, ♀, Thailand; 34, ♀, India, Khasia; 35, ♂, Japan. 36—39, first metasomal segment; 36, ♂, India, Darjeeling; 37, ♂, China, Tibet; 38, ♀, holotype *S. d. femorale* ssp. n.; 39, ♀, Taiwan. 33—39: scale-line; 31, 32: $4.0 \times$ scale-line; 29, 30: $8.0 \times$ scale-line.

Mainpuri, India (BMNH; examined).

Sceliphron curvatum; Strand, 1915: 91 (Naga Hills).

Sceliphron deforme; Kohl, 1918: 122; Basil-Edwards, 1921: 293—297, figs. 1, 2 (bionomics at Simla, India); Beaumont, 1969: 390 (Afghanistan: Kabul).

Sceliphron (Prosceliphron) curvatum; Bohart & Menke, 1976: 106; Van der Vecht, 1984: 213—219, figs. 1—5 (descriptions ♀, ♂; established in the Steiermark, Austria).

Type. — The BM possesses a male with labels “*Pelopoëus curvatus* (type) Smith” in Smith’s handwriting, and “69—86”, which means, according to the BM register: “Presented by Ch. Horne, these are the type spec. descr. in the VII vol. Tr. Zool. Soc.”. The description speaks only of female, apparently more than one, since a range of lengths is given. The specimen mentioned is probably one of the types, and somehow a mistake was made in the description. I designate it herewith as the lectotype.

Description. — Body length: ♀ 15.6—18.0 mm, ♂ 16.0—17.3 mm; length of forewing: ♀ 10.8—12.1 mm, ♂ 10.3—10.8 mm. Pubescence: yellowish-white, tomentum of face pale-golden.

Morphology: Female. — Clypeus with only feebly differentiated lobes (fig. 25); post-antennal tubercles moderately large (fig. 23); interocular distance at vertex larger than first flagellomere; pronotum with median impression, in lateral view narrow (fig. 26); mesoscutum irregularly transversely strigose, with dense shallow punctation over the whole surface, comparatively dull; other parts of integument of head and mesosoma also more distinctly punctate and less shiny than in other *Prosceliphron*; dorsal margin of propodeal orifice narrow and rounded (fig. 24); claws of fore legs untoothed; petiolus short, curved, first tergite swollen, but not as strongly as in *S. deforme* and *S. fervens* (fig. 27). IFR 1.10—1.21; PTR 0.75—0.77; PR 0.06—0.07; TR 0.18—0.26; SR 0.84—0.88. Male. — Like the female but apical margin of clypeus laterally shallowly emarginate (fig. 22), as in *S. deforme*; petiolus longer (fig. 28); genitalia (fig. 20, 21) similar to those of *S. fervens* and *S. deforme*, but cuspis with comparatively more and denser pubescence, volsellar plate of slightly different shape, gonostyles not pointed apically, and with better differentiated lamellae than in *S. fervens*. IFR 1.13—1.21; PTR 0.86—1.00; PR 0.08—0.11; TR 0.16—0.20; SR 0.72—0.76.

Coloration: As described by Van der Vecht (1984) in full detail. Diagnostic features are the

presence of reddish-yellow bands on all tergites and sternites, and the laterally abbreviated clypeal mark. Spots at the basis of the propodeum are only present in specimens from Tadzhikistan and Pakistan.

Distribution. — Originally the species seemed to be confined to mountainous regions South and West of the Himalayas, in Tadzhikistan, Pakistan, India and Nepal (fig. 119). The record of *S. deforme* from Afghanistan (Beaumont, 1968) probably pertains to *S. curvatum*.

Material examined. — Kazakhstan. — 2 ♀, N. Tashkent, Gr. Tchimgan, 2500 m, 12 July 1984, J. Oehlke (DEI).

Tadzhikistan. — 1 ♀, Kalai-Vamar, Roshan (37°50'N, 72°30'E), 30 June 1937, Lupkova (ZIL).

Pakistan. — 1 ♀, Hazara, Kawai, Shogran, 2300 m, 14—17 May 1978, C. Holzschuh (Coll. Gusenleitner).

Nepal. — 1 ♀, Kathmandu, 1300—1400 m, May 1966, J. & M. Sedlacek (BPBM); 1 ♀, 5 mls. W. of Pokhara, 3000 ft., 13 May 1954, J. Quinlan (BMNH); 3 ♀, Taplejung Dist., Sango, 6200 ft., Sep.—Oct. 1961, R. L. Coe (BMNH); 1 ♀, Kathmandu, 1500 m, June 1982, 6 ♀, Kakani, 2070 m, June 1984, all M. G. Allen (BMNH).

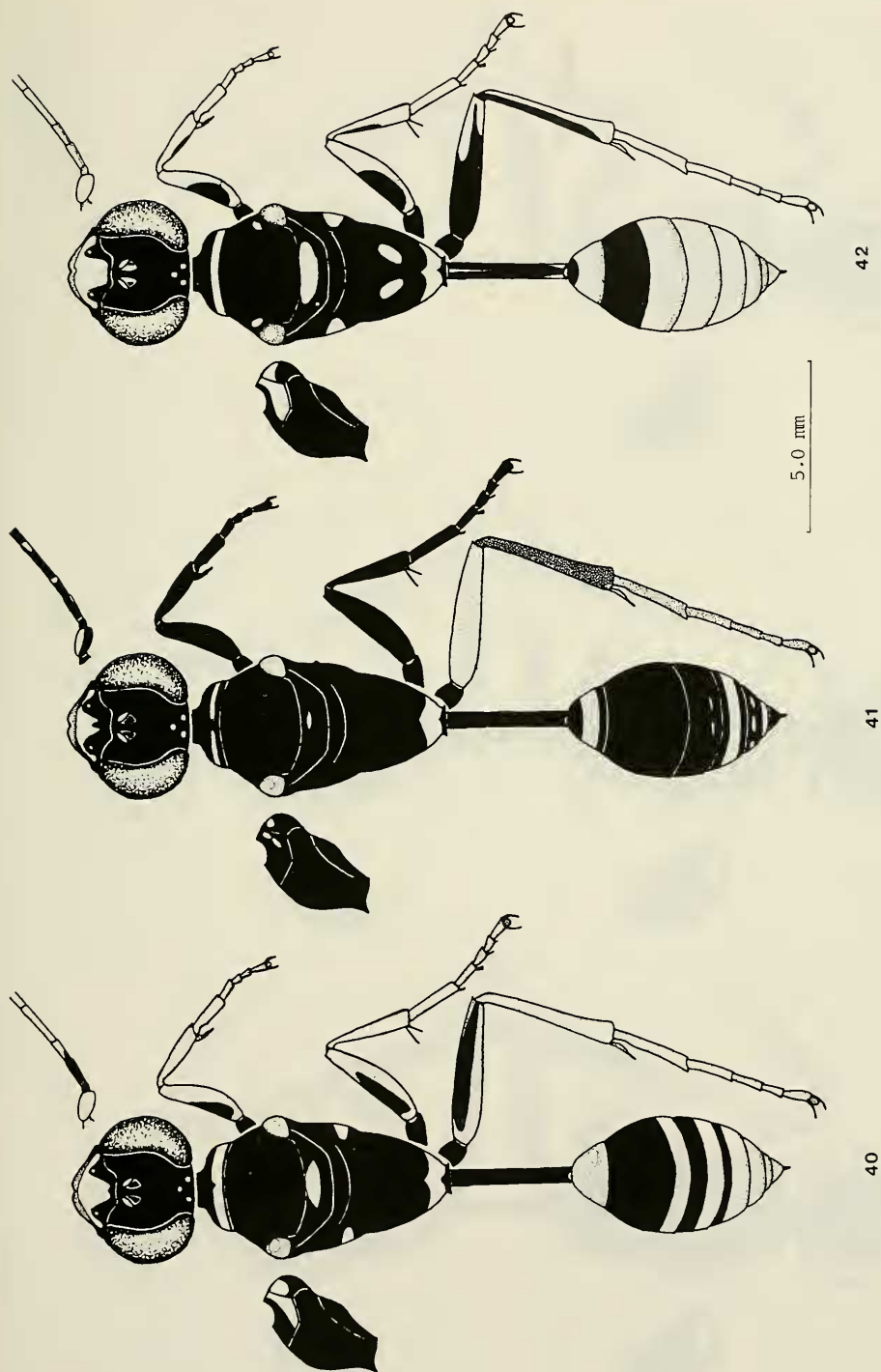
India. — 1 ♀, Nat. Highway 110 km N. Jammu, 6 July 1978, J. Timmer (ZMA); 1 ♀, Punjab, 1886, Harmand 411—87 (MNHN); 5 ♀, Mussoorie, 23 May 1905, E. Saunders coll. (BMNH); 8 ♀, Simla, May 1897, Nurse (BMNH); 1 ♀, Mussoorie (NMW); 1 ♀ Himalaya, Felder (RMNH); 1 ♀, Simla, 26 Nov. 1918, Brunetti (BMNH); 1 ♀, Kumaon, April 1890, coll. Bingham (BMNH); 1 ♀, W. India, Bacon (OUM); 1 ♀, Xymcan, S. P. Yzau, 12 June 1970 (?) USNM).

Austria. — 2 ♀ 4 ♂, Steiermark, Demmerkogel/Sausal, 12 July 1983, J. & E. van der Vecht (RMNH, USNM).

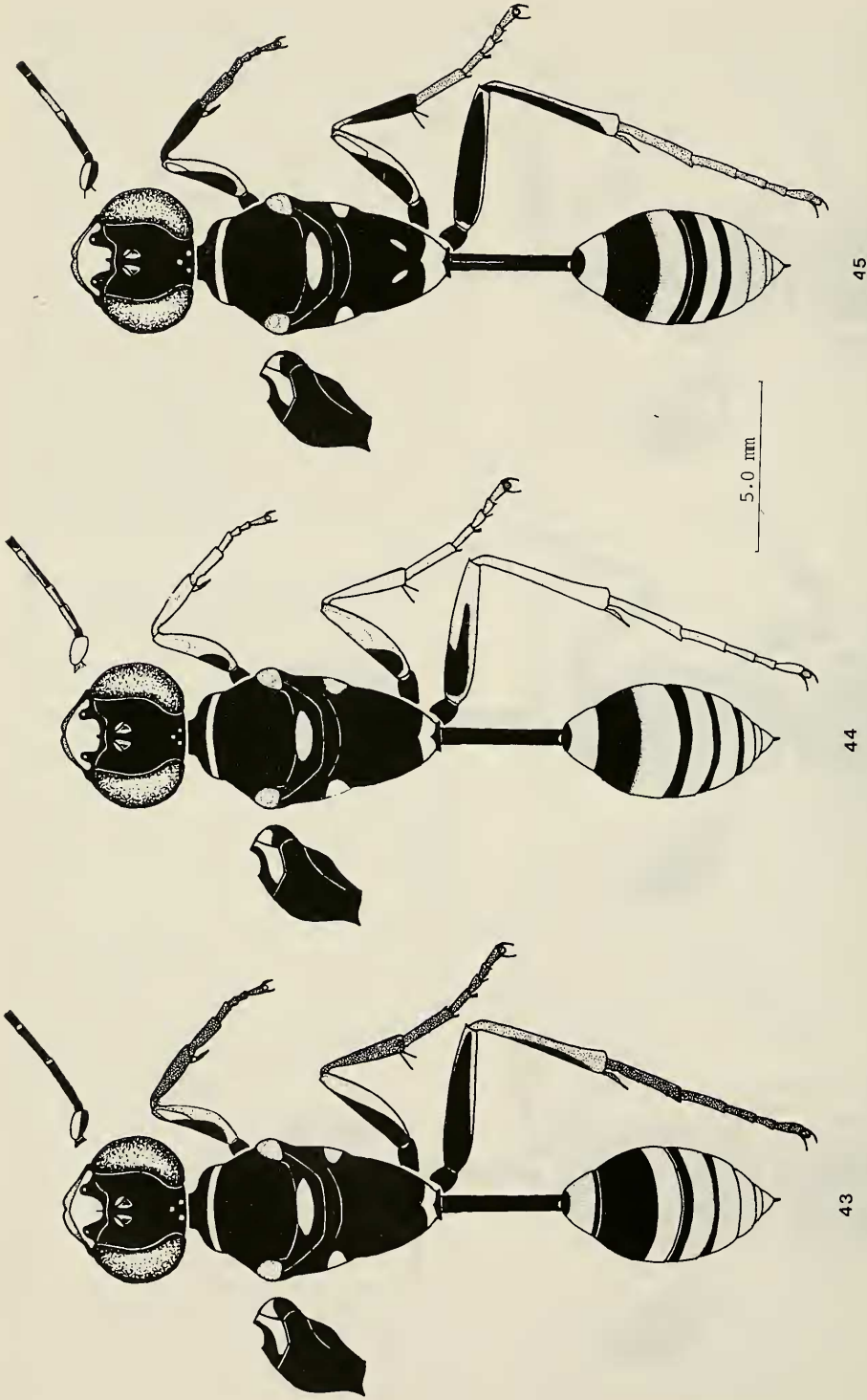
Sceliphron deforme (Smith) (figs. 1, 29—48, 116)

Description. — Body length: ♀ 16.2—20.7 mm, ♂ 14.4—16.5 mm; length of forewing: ♀ 10.4—13.3 mm, ♂ 10.3—12.1 mm. Pubescence: erect pubescence of head and mesosoma white or slightly yellowish, tomentum of face usually pale-golden. Wings hyaline, apex of forewing darkened, but dark area not sharply defined.

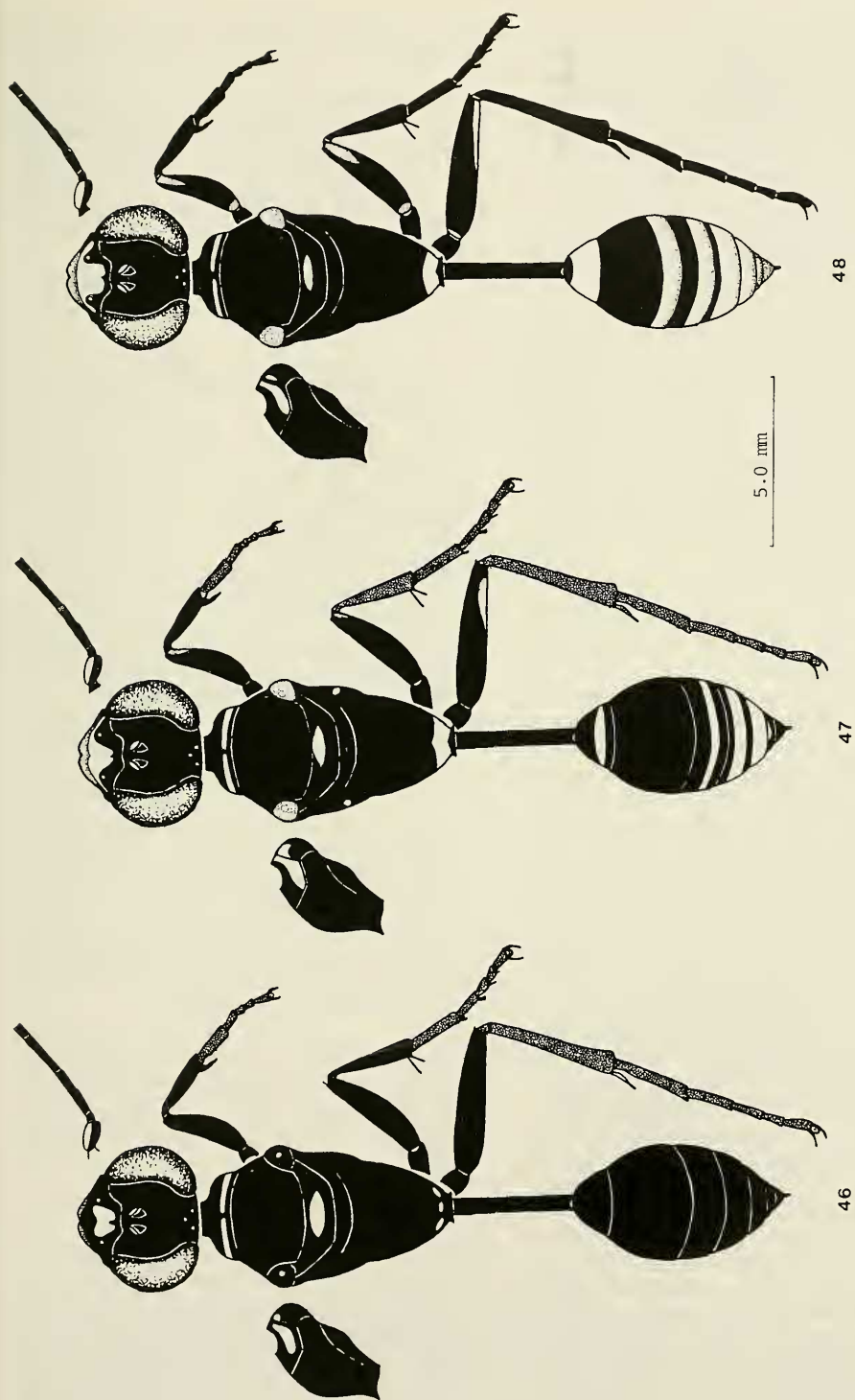
Morphology: Female. — Clypeus without



Figs. 40—42. *Sceliphron deformе* (Smith), colour patterns. 40, *S. d. tibiale* Cameron, ♀, India, Khasia; 41, *S. d. femorale* ssp. n., ♀, holotype; 42, *S. d. deformе* (Smith), ♀, China, Tibet.



Figs. 43—45. *Sceliphron d. deforme* (Smith), colour patterns. 43, ♀, China, Szechwan, Suifu; 44, ♀, Taiwan; 45, ♀, China, Kiangsu.



Figs. 46—48. *Sceliphron deforme* (Smith), colour patterns. 46—47, *S. d. atripes* Morawitz; 46, ♀, lectotype; 47, ♀, USSR, Vladivostok; 48, *S. d. nipponicum* Tsuneki, ♀, Japan, Honshu.

lateral incisions (fig. 33, 34); interocular distance at vertex rather large, but not as large as in *S. curvatum*; post-antennal tubercles variable in size; pronotum with median impression; mesoscutum sharply transversely striate, laterally and anteromedially with more or less distinct punctation between the striae; propodeal orifice with narrow, rounded dorsal margin (cf. fig. 24); petiolus short, shorter than hind tibia, and strongly curved, first tergite long and strongly swollen (figs. 28, 39). IFR 0.93—1.10; PTR 0.82—0.97; PR 0.09—0.12; TR 0.22—0.36; SR 0.70—1.00. Male. — Like the female, but clypeus with small triangular lobes, laterally of which the margin is distinctly emarginate (fig. 35); petiolus longer, first tergite shorter and more strongly swollen (figs. 36, 37); genitalia (figs. 29, 30) with comparatively slender aedeagus and volsella, volsellar plate oblong, hardly differentiated, pubescence of cuspis comparatively short. IFR 1.00—1.23; PTR 0.86—1.10; PR 0.10—0.14; TR 0.28—0.38; SR 0.67—0.92.

Distribution. — Continental Asia from Kazakhstan to Thailand and the Ussuri-area; Taiwan, Japan (fig. 116).

The species shows a considerable amount of variation over this area, mainly with respect to colour-pattern, but also in the shape and size of the post-antennal tubercles. This last character appears to vary clinally, the Northern forms having large, conspicuous tubercles, whereas in Southern specimens these structures are hardly developed. I have tried to express the variation by distinguishing a number of subspecies, for most of which names are already available. I am well aware of the fact that in some cases the limits between these are purely artificial. This is due to the fact that where several characters can be used to define continental subspecies, these characters may show zones of intergradation which are geographically separated. A clear example is presented in the subspecies *d. deforme* and *d. atripes*: *S. d. atripes* typically has large post-antennal tubercles, and a strongly reduced colour-pattern, but specimens from Korea and Northern China combine large tubercles with the bright colour-pattern of *d. deforme*, which typically has rather small tubercles. Thus this population, as a whole is intermediate between two other subspecies, and cannot be considered a separate third subspecies, but neither can it be placed unequivocally under one of the two. In other cases however, the limits between the subspecies may be fairly sharp, for example be-

tween *deforme* and *tibiale*, which are separated by the natural barrier of the Himalayas.

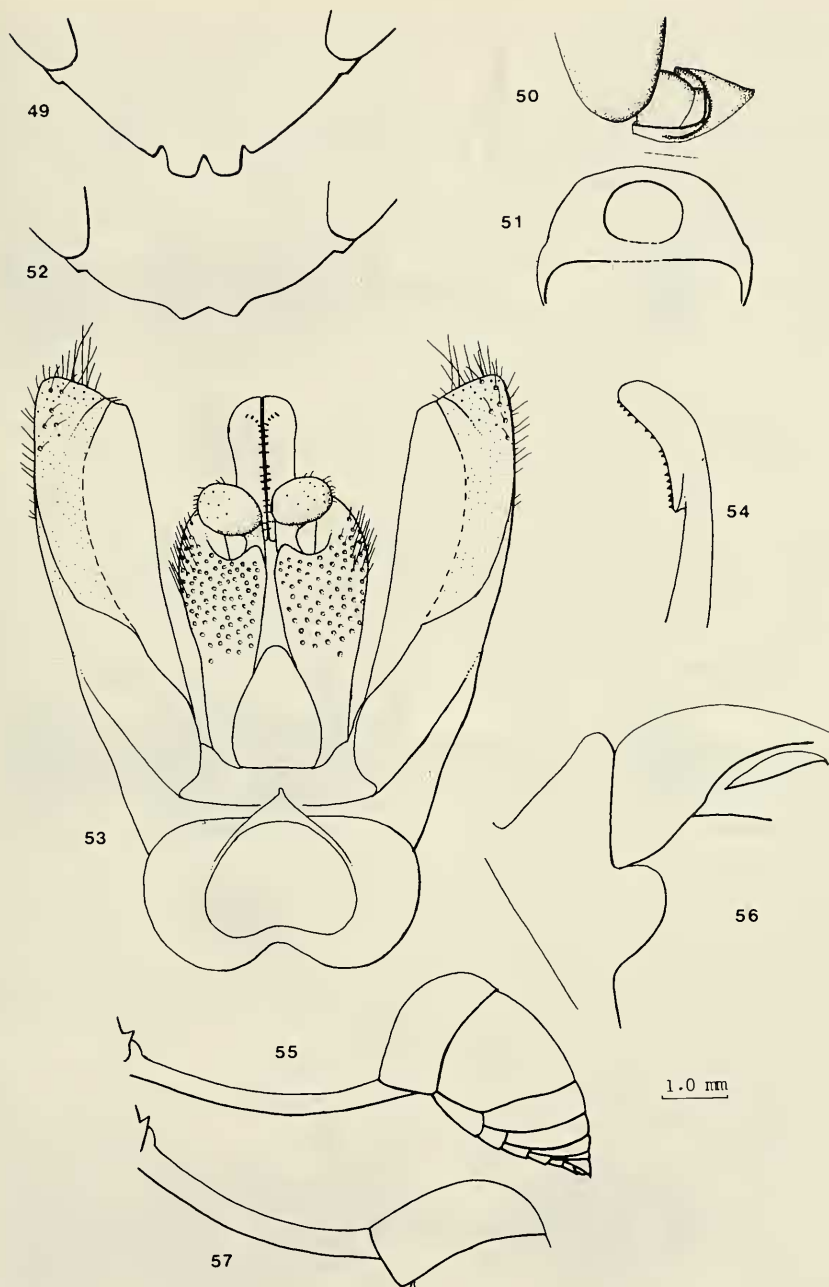
The following key may serve to distinguish between the subspecies. It is based on females, since the range of variation in males does not allow the construction of an adequate key. However, in general the males show the same geographic variation in characters.

Key to the subspecies of *Sceliphron deforme* (Smith)

1. Antennal scapes dorsally black 2
- Antennal scapes completely yellow or reddish dorsally 5
2. Hind femora nearly entirely reddish, in contrast to the fore and middle, which are nearly entirely black; post-antennal tubercles small, black (fig. 31); Thailand, Laos *femorale* ssp. n.
- Hind femora largely black, like the fore and middle; post-antennal tubercles variable . . . 3
3. Post-antennal tubercles very large, dorsally truncate (fig. 32); Southern Siberia, Mongolia to Korea *atripes* (Morawitz)
- Post-antennal tubercles small (fig. 31) . . . 4
4. Yellow colour-pattern reduced: flagellum entirely black, basal propodeal spots absent, hind tibiae black (fig. 48); Japan *nipponicum* Tsuneki
- Yellow colour-pattern more extensive: second flagellomere anteriorly reddish, basal propodeal spots present, hind tibiae partly reddish (figs. 43, 45); China *deforme* (Smith)
5. Yellow bands on first and second tergite complete; post-antennal tubercles with yellow spot (figs. 42, 44); China *deforme* (Smith)
- Bands on first and second tergite reduced, largely suffused with red; post-antennal tubercles black (fig. 40); Northern India, Burma *tibiale* Cameron

Sceliphron deforme tibiale Cameron (figs. 40, 116)

- Sceliphron formosum*; Bingham, 1897: 236, 239, ♀ ♂.
Sceliphron tibiale Cameron, 1899: 53 (sex not mentioned) — Khasia Hills (OUM; examined).
Sceliphron lineatipes Cameron, 1900: 36, ♀ ♂ — Khasia Hills, coll. Rothney (OUM; examined).
Sceliphron deforme; Strand, 1914: 116 (nest); Kohl, 1918: 122 (Bombay, Darjeeling, Burma: Moulmain, Tenasserim).



Figs. 49—57. *Sceliphron fervens* (Smith). 49—50, ♀, Indonesia, Borneo, 49, clypeus; 50, antennal insertion. 51, ♀, Malaysia, propodeal orifice. 52—55, ♂, Malaysia, 52, clypeus; 53, genitalia, ventral aspect; 54, inner side of left half of aedeagus; 55, metasoma, lateral aspect. 56, ♀, Malaysia, pronotum, lateral aspect. 57, ♀, Indonesia, Borneo, first metasomal segment. 49, 52, 55, 57: scale-line; 56: 2.0 × scale-line; 50—51: 4.0 × scale-line; 53, 54: 8.0 × scale-line.

Sceliphron (Prosceliphron) deforme tibiale; Bohart & Menke, 1976: 106.

Types. — The OUM possesses one female specimen labelled "*Sceliphron tibiale* Cameron, type, Khasia", which I herewith designate as the lectotype. In the BMNH I have seen two females labelled "*S. tibiale* Cameron, Khasia", "ex FMS 1955—354", which I have labelled as paralectotypes, since *S. tibiale* was described from material in the FMS-collection.

S. lineatipes was described from OUM-material. I found there two male specimens on one pin, with label "*Sceliphron lineatipes*, type, Cameron". The upper specimen fits the rather incoherent description best: it agrees at least with the Latin diagnosis. I herewith designate it as the lectotype. The lower specimen is paralectotype, as is a male labelled "*Sceliphron lineatipes* Cam., type, Khasia" in the BMNH. Several of 72 partly unlabelled specimens in the OUM and ZMA may have been part of the original type-material too, since *S. tibiale* was described from both sexes, but there is no evidence based on label data which allows designation of more paralectotypes.

Description. — Post-antennal tubercles small (cf. fig. 50), black. Yellow colour-pattern rather extensive (fig. 40). Characteristic are: antennal scape yellow or reddish yellow; propodeum often with a pair of spots at apex of the dorsal enclosure; legs reddish except the coxae, trochanters and base of femora dorsally; metasoma with broad yellow bands on all tergites, those on first and second tergite suffused with red or reduced; sternites with lateral reddish-yellow spots.

In the male the coloration is like the female or more or less reduced: clypeus with a pair of small spots or completely black, scapes dorsally black, spots at basis of propodeum small or absent; legs brownish, hind femora ventrally somewhat lighter; metasoma with narrow bands on fourth to sixth tergite, those on second and third reduced or absent.

Variation. — Specimens from Darjeeling tend to be more brightly coloured than described above: in the male the clypeus bears a large mark, the scapes are red dorsally, the legs are mainly red-yellow and the metasoma has complete bands on all tergites.

Material examined. — India. — 1 ♀, Dacca, 30 May 1945, D. Leston (BMNH); 2 ♀, N. Khasia Hills (BMNH); 5 ♀ 5 ♂, Khasia, coll.

Bingham (OUM); 4 ♀, Sikkim, Runjit Valley, 1000 ft., April 1894, Bingham coll. (BMNH); 3 ♀, Sikkim, F. A. Müller (UZM); 1 ♀, N.W. India (BMNH); 1 ♀, N. India, Lukna, 55 km S. Darjeeling, May 1966, Sedlacek (BPBM); 3 ♀, Sikkim, coll. Bingham (BMNH); 2 ♀ 1 ♂, Darjeeling, coll. Frühstorfer (RMNH); 19 ♀ 10 ♂, Khasia Cameron (ZMA); 10 ♀, Sikkim, coll. Bingham (ZMB).

Burma. — 1 ♀, Rangoon Dist., March 1888, Bingham coll. (BMNH); 1 ♀, Pegu Hills, March 1889 (BMNH).

Sceliphron deforme femorale ssp. n. (figs. 38, 41, 116)

Holotype. — ♀, Thailand, Chiangmai, 4 May 1952, D. & E. Thurman (USNM).

Description. — Post-antennal tubercles small, black (like in *S. d. tibiale*); colour-pattern much less extensive than in adjacent subspecies (fig. 41); antennal scape yellow ventrally; pronotum with narrow, interrupted yellow band; subtegular spots small; scutellum with narrow transverse spot; propodeum only with small apical spot; fore and middle femora black, with small yellow spot apically; hind femora reddish; legs otherwise blackish; metasoma black, first tergite medially reddish-yellow, third with strongly reduced, fourth with complete yellow apical band; fifth and sixth reddish-yellow; tomentum of face golden, erect pubescence purely white.

Structurally *S. d. femorale* is identical with *S. d. tibiale*. With respect to colour-pattern however, the form resembles the related species *S. fervens*, which occurs in the adjoining area; this particular colour-pattern may thus represent an independently developed environmental adaptation.

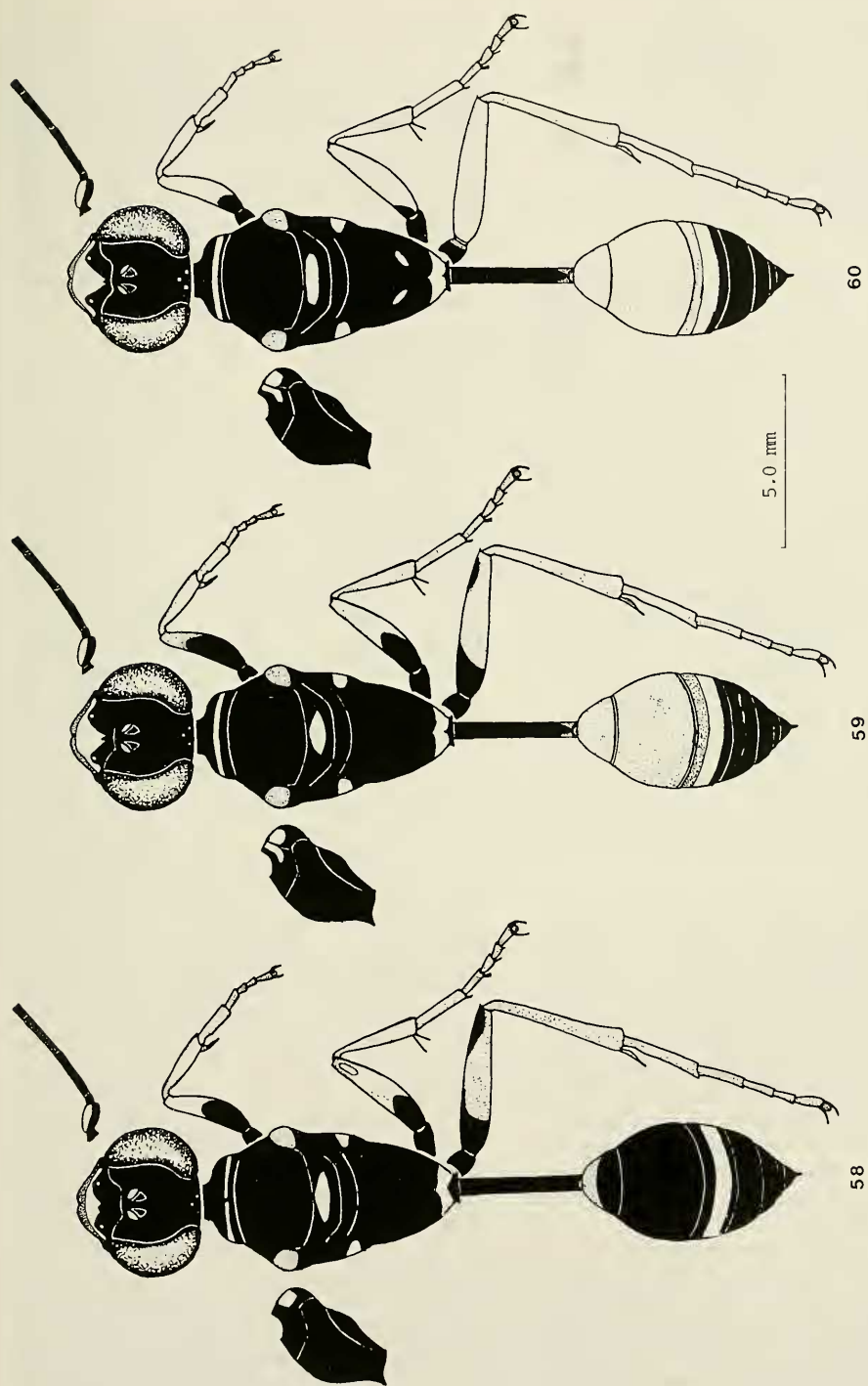
Paratypes. — Thailand. — 1 ♀, Doi Suthep, 4–10 May 1952, D. & E. Thurman (USNM); 2 ♀, Khun Tan Mts., May 1933, 4000 ft., H. Smith coll. (USNM, RMNH) (with basal spots on propodeum, larger scutellar band, one with complete band on third tergite).

Laos. — 2 ♀, Pak Kop, Mekong River, 7 May 1920, R. V. de Salvaza (BMNH) (one of these with propodeal spots basally).

Sceliphron deforme deforme (Smith) (figs. 31, 43–45)

Pelopoëus deformis Smith, 1856: 231, ♀ — North China, coll. Fortune (BMNH; examined).

Sceliphron deforme; Strand, 1914: 116 (Tsingtau,



Figs. 58—60. *Sceliphron fervens* (Smith), colour patterns. 58, West Malaysia; 59, ♀, Malaysia, Sarawak; 60, ♀, Philippines, Palawan.

nest); Turner, 1917: 176; Kohl, 1918: 122—123, figs. 26, 27; Gussakovskij, 1936: 4 (N. E. Szechwan); Iwata, 1939: 169, fig. 21 (Formosa, bionomics); Yasumatsu, 1942: 106 (Peking); Tsuneki, 1967 (Formosa).

Sceliphron deformae taiwanum Tsuneki, 1971: 6, ♀ ♂ — Taiwan, Taitung pref., Chulu (coll. Tsuneki; not examined); Bohart & Menke, 1976: 106.

Sceliphron (Prosceliphron deformae deformae); Bohart & Menke, 1976: 106.

Type. — The specimen which was figuring as the type of *S. deformae* in the BM (no. 21.613) belongs to *S. curvatum*. It was evidently incorrectly labelled, since it does not agree with the description of *S. deformae*, which mentions a "spot at each side of the metathorax at base"; such spots fail in *S. curvatum*, and moreover, *S. curvatum* does not occur in Northern China. The lectotype by present designation is a female in the BMNH with label "N. China, 54—8" (according to the register: "China, Shanghai, purchased from Stevens, coll. by Fortune"). There is one other specimen which is old enough, and may have been a syntype. It is labelled "56—45, China" ("April; China, purch. from Stevens, coll. by Mr. Bowring") and "type *rufopictus* Smith" in Smith's handwriting.

There are two female specimens in the Saunders' collection (OUM) standing as syntypes of *S. deformae*. One of these belongs to *S. deformae*, the other to *S. curvatum*. There is no evidence that these were part of the original type-material.

Description. — Female. — Post-antennal tubercles of intermediate size (fig. 31), larger than in *S. d. tibiale*, smaller than in *S. d. atripes*, usually with yellow spot; colour-pattern rather extensive (figs. 42—44), only slightly darker than *tibiale*: scapes often black dorsally, tegulae with yellow mark, propodeum with large basal spots, and sometimes with a pair of spots at apex of the dorsal enclosure, legs blackish to red-brown, femora largely black dorsally, ventrally lighter, metasoma with broad reddish-yellow bands on all tergites, sternites 2—5 with bands or lateral spots.

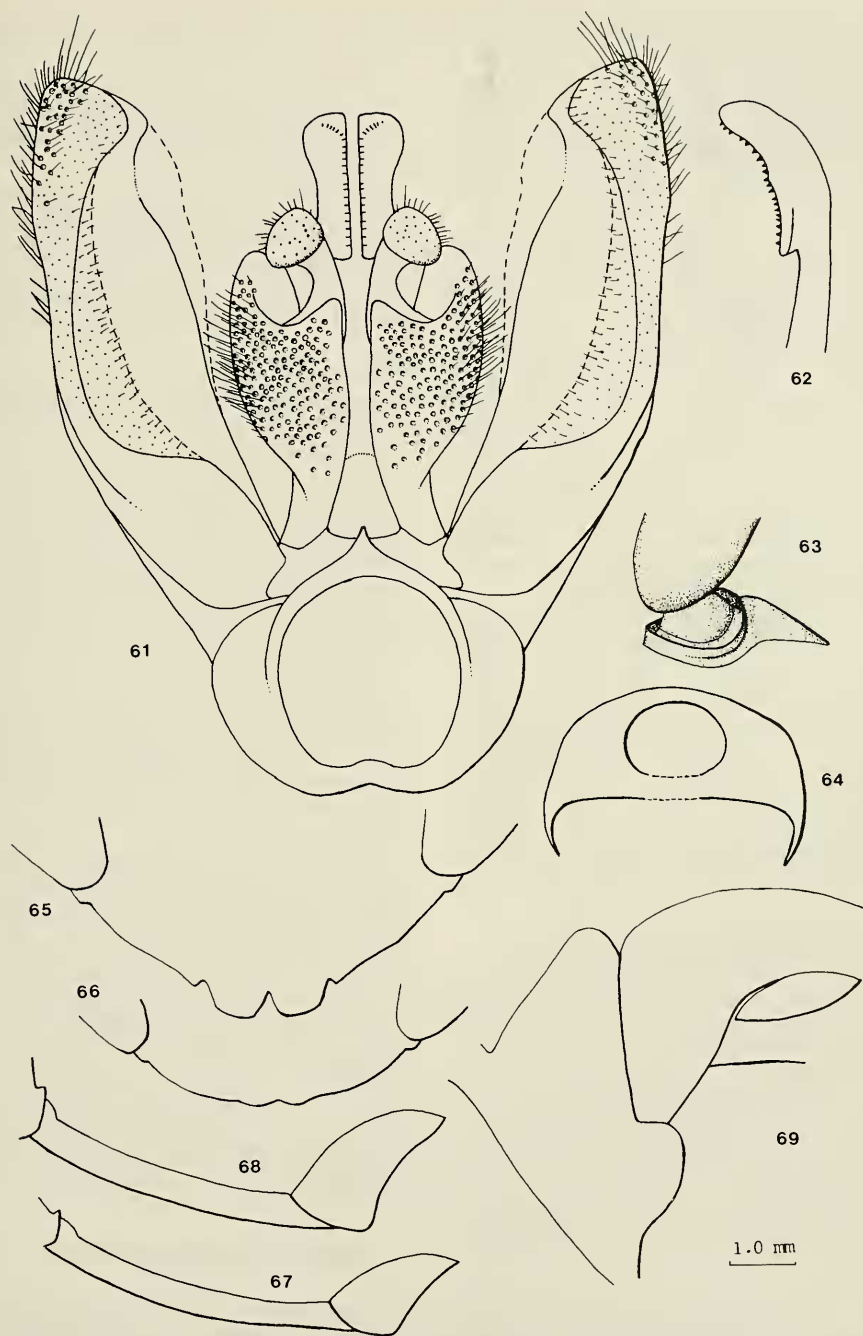
Male. — Darker than the female, but very variable: clypeus often only with a pair of small spots, basal propodeal spots reduced or absent, bands on tergites usually reduced, sometimes nearly absent.

Variation. — Female specimens from Tibet are very brightly coloured (fig. 42): the scapes are completely yellow, post-antennal tubercles

with yellow mark, often small spots on sides of pronotum, and marks on the mesoscutum in front of the tegula, propodeum with a pair of spots in the dorsal enclosure, legs mainly yellow, femora dorsally black on proximal half, petiolus largely or partly yellow. The coloration of the Taiwanese population was described by Tsuneki (1971), and is illustrated in fig. 44. The pattern is somewhat less bright than that of the Tibetan specimens, and brighter than that of the other mainland populations (fig. 45). I prefer therefore to regard Tsuneki's *S. deformae taiwanum* as part of the nominate species.

Material examined. — Mongolia. — 1 ♂, Tchi-Li, J. de Joannis, 1890 (MNHN); 1 ♀, Tcheli, J. de Joannis, 1903 (MNHN).

China. — 1 ♀, Ningpo, Aug. 1949 (NMB); 1 ♀, China (OUM); 2 ♀, Tientsin, N. China; 1 ♀, Peking, "*curvatum*, det. Kohl", "*deformae*, det. Kohl"; 1 ♀, Tientsin, Walte; 1 ♀, Tsingtau, Prof. Hoffmann; 1 ♀, Tschili; 1 ♂, Tientsin (all NMW); 3 ♂ 1 ♂, Shankhov, Honan, D. Renard (IRSN); 4 ♀ 2 ♂, Kiangsi, A. David, 1875; 1 ♀, Kiangsu, Shanghai, 27 July 1925, 1 ♂, Shanghai, 14 Aug. 1924, both O. Piel; 1 ♂, Kouytcheou, 1921, Cavalerie; 1 ♀ 1 ♂, Shensi, 1875, A. David (all MNHN); Canton, 1 ♀, 8 June 1917, 2 ♂ 1 ♀, 10 May 1917; Lungtaoshan, Kwangtung, 1 ♀, 17 Sep. 1917, 1 ♀, 10 Sep., 1 ♀, 10 June 1917; Lofaoshan, Kwangtung, 1 ♀, 20 July 1916, 1 ♂, 11 Aug. 1916, 1 ♀ 1 ♂, 20 May 1917, 1 ♂, 1 May 1917; Gaotung, Kwangtung, 1 ♂, 3 June, 1 ♂, 9 June; Tshayunshan, Kwangtung, 1 ♀, 11 Aug. 1912, 1 ♀, 24 June 1912, 1 ♀, 13 June 1912; 1 ♀, Sholyunshan, 30 May; all leg. Mell (ZMB); 1 ♀, Chinkiang, 10 June 1924, 1 ♀, Mokanshan, 18 July 1924, both J. F. Illingworth (BMNH); 1 ♀, Hongkong, F. W. Ferry, 1 ♀, Tonkin, Hoabink, Aug. 1918, R. V. de Salvage; 2 ♀, Howlik, R. C. L. Perkins coll.; 1 ♀, Peiping, C. F. Wu coll.; 1 ♀, Foochow, June 1936, M. S. Yang; 1 ♀, Yunnan, 1918, G. Forrest; 1 ♀, Shanghai, 1 ♀, Sinling, pr. Shen-Se, W. A. Maw; 1 ♂, Shihchiachwang, C. F. Wu coll. (all BMNH); 5 ♀, Kiangsu, Kolthoff (NRS); 1 ♀, Kina, N.O. Szechwan, Sven Hedins Exp. C. Asien, Dr. Hummel (NRS); 1 ♀, Foochow, Kellogg (MCZ); 1 ♀, Huaying Shan, Szechwan, Aug. 1932, G. Liu (MCZ); China-Tibet border, 3 ♀, Ludingshiao, 4900 ft., 12—20 Aug. 1930, 1 ♀, Bet. Uenchuan and Mowchow, 4500—5500 ft., 3—6 Aug. 1924, 1 ♀, Dashianglin Pass, 4960 ft., 23 Aug. 1930; Suifu, 1 ♂ 4 ♀, 1928, 1 ♀, May-June 1929, 1000—



Figs. 61—69. *Sceliphron coromandelicum* (Lepeletier). 61—62, ♂, Malaysia. 61, genitalia, ventral aspect; 62, inner side of left half of aedeagus. 63—65, ♀, India, Kerala. 63, antennal insertion; 64, propodeal orifice; 65, clypeus. 66—67, ♂, Malaysia. 66, clypeus; 67, first metasomal segment. 68—69, ♀, Malaysia. 68, first metasomal segment; 69, pronotum, lateral aspect. 65—68: scale-line; 69: 2.0 × scale-line; 63, 64: 4.0 × scale-line; 61, 62: 8.0 × scale-line.

2000 ft.; 5 ♀, Shinkaisi, Mt. Omei, 4000—5000 ft.; 2 ♀, Yao-Gi, 4800 ft., 3 July 1929; 1 ♀, Chiacopin, 22 Jan. 1933, 2100 ft., 1 ♀, Donomenwai, 10 mi. W. Weichow, 5600 ft., 1933; 1 ♀, S. of Suifu, Aug. 1929; 1 ♀, Tseojiageo, S. of Suifu, Sep. 1929, 1400—2000 ft.; 1 ♀, near Yachow, 2 July 1930; 7 ♀, Kuanshien, 3000 ft., 1—4 Aug. 1934; 8 ♀ 2 ♂, Fulin, 2400 ft., 17—18 July 1928, 2 ♀, Ningyuenfu, 6000—6200 ft., 2—4 Aug. 1928; 2 ♀, Bet. Ginkeoho and Shinkaishi, 3—4 Aug. 1925; 1 ♀, Tsaekeo; all D. C. Graham coll. (USNM).

Taiwan. — 1 ♀, Taihorinsho, Aug. 1908, 1 ♀, Fuhosho, Sep. 1909, 2 ♀, Taihorinsho, Oct. 1909, 2 ♀, Fuhosho, Aug. 1909, 1 ♀, Kanshirei, 1908, all Suater (TMA); 1 ♀, Kuraru, 7 May 1934, L. Gressitt (MCZ); 6 ♂ 1 ♀, Taipei-hsien, Wulai, 4 July 1966, 1 ♂, Nantou-hsien, Puli, 11 July 1966, 3 ♀, Taitung-hsien, Chulu, 12 Aug. 1966, 1 ♀, id., 29 June 1968, 2 ♀, Taitung-hsien, Chihpechi, resp. 13 Aug. 1966 and 30 June 1968, all leg. K. Tsuneki (RMNH).

Japan. — Chiba Pref., 1 ♀, Usui, Sakura City, 9 Sep. 1968, 1 ♀, Oamish irasato, Sanbu Gun, 10 Sep. 1970, 1 ♀, Kuriyama, Matsudo City, 22 Aug. 1963, 2 ♂, Mt. Kasamori, Chonan, 3 Sep. 1970, 1 ♂, Zenshoji Toke, Chiba City, 10 Sep. 1970, all leg. H. Suda (RMNH).

Vietnam. — 2 ♀, Ht. Tonkin, Phuon Lom, (J. J. M. Laisi) R. Oberthür 1901 (MNHN) (transitional between *S. d. deforme* and *S. d. femorale*; band on second tergite reduced, hind femur less dark than fore and middle).

Sceliphron deforme atripes (Morawitz)

(figs. 32, 46, 116)

Pelopoeus atripes Morawitz, 1888: 271, ♀ — Semipalatinsk (ZIL; examined).

Sceliphron deforme; Kohl, 1918: 122, 123, 133 (original description).

Sceliphron formosum var. *koreanum* Uchida, 1925: 329 (description in Japanese) (not examined).

Sceliphron deforme koreanum; Tsuneki, 1967: 6 (description ♀ ♂).

Sceliphron (Prosceliphron) deforme atripes; Bohart & Menke, 1976: 106.

Sceliphron (Prosceliphron) deforme koreanum; Bohart & Menke, 1976: 106.

Type. — The Zoological Institute at Leningrad possesses two syntypes of *P. atripes* Morawitz. The lectotype, by present designation, is a female, labelled "Semipalatinsk", "k. F. Morawitz" and "*atripes* ♀, F. Morawitz". The paralectotype is labelled "Semipalatinsk", "k. F. Morawitz" and "*Pelopoeus atripes* ♀, F. Mora-

witz". It lacks forewings, antennae and the legs largely.

Description. — Morphology. — Post-antennal tubercles exceptionally large, dorsally truncate (fig. 32).

Coloration. — In the type-specimens, the colour-pattern is strongly reduced (fig. 46): the metasoma bears no yellow bands, and the mesosoma is almost entirely black; specimens from the Eastern part of the area occupied by this subspecies are more brightly coloured (fig. 47).

Material examined. — Mongolia. — 1 ♀ 1 ♂, Dinyuanin, s. Alashan, 5—14 Aug. 1908, Kozlow (ZIL); 1 ♀, Dundusaichan, Gobi, 9 July 1909, Kozlow (ZIL).

China. — 1 ♀, China, 801, 48, *curvatum* Sm det. Kohl (RMNH); 1 ♀, Peking, C. F. Wu coll. (BMNH); 1 ♀, Nord Peking, A. David, 1865 (MNHN); 1 ♀, "Chasyang", A. P. Jacot, Aug. 1921 (MNHN); 1 ♂, Petaiho Beach, Hopei Prov., Kina, 1942, A. M. Hemingston (RMNH); 1 ♀, Heishan, Liaching, C. F. Wu coll. (BMNH).

Korea. — 3 ♀, Geumgok, Jinyang-gun, Gyeongnam, July—Aug. 1984, 2 ♀, Mt. Jiri, 17 July 1984, all G. J. Jeong (RMNH); 1 ♂, Shoyozan, 30 May 1943, K. Tsuneki (RMNH); 3 ♀, Korea, Kim coll., (BMNH); 1 ♀, "Corea" (BMNH).

USSR. — 1 ♂ 3 ♀, Vladivostok, Sedanka, Malaise (NRS); 2 ♀, Vladivostok, Suchan, Malaise (NRS); 1 ♀, Ussuri (USNM); 1 ♀, Okeanskaya, Siberia, Aug. 1923, Cockerell (USNM); 1 ♀, Suputniskij zap-k., Primorskij Kraj, Lelej (RMNH) (45° N, 136° E); 1 ♀, Kongaus, Siberia, Aug. 1923, Cockerell (USNM); 2 ♀, Onon, Amour (MNHN); 2 ♀, Amour, Siberia (BMNH); 1 ♀, Okeanskaya, Ussuri, 3 July 1911, Cherskiu (ZIL); 1 ♀, Yakovlevka, Ussuri, 12 Sep. 1926, Diakonov Filipev (ZIL); 1 ♀, Primorje Dist., 20 km E. Ussurijsk, Goznotajozhnoje, 23 July 1983, E. Budrys (ZIL).

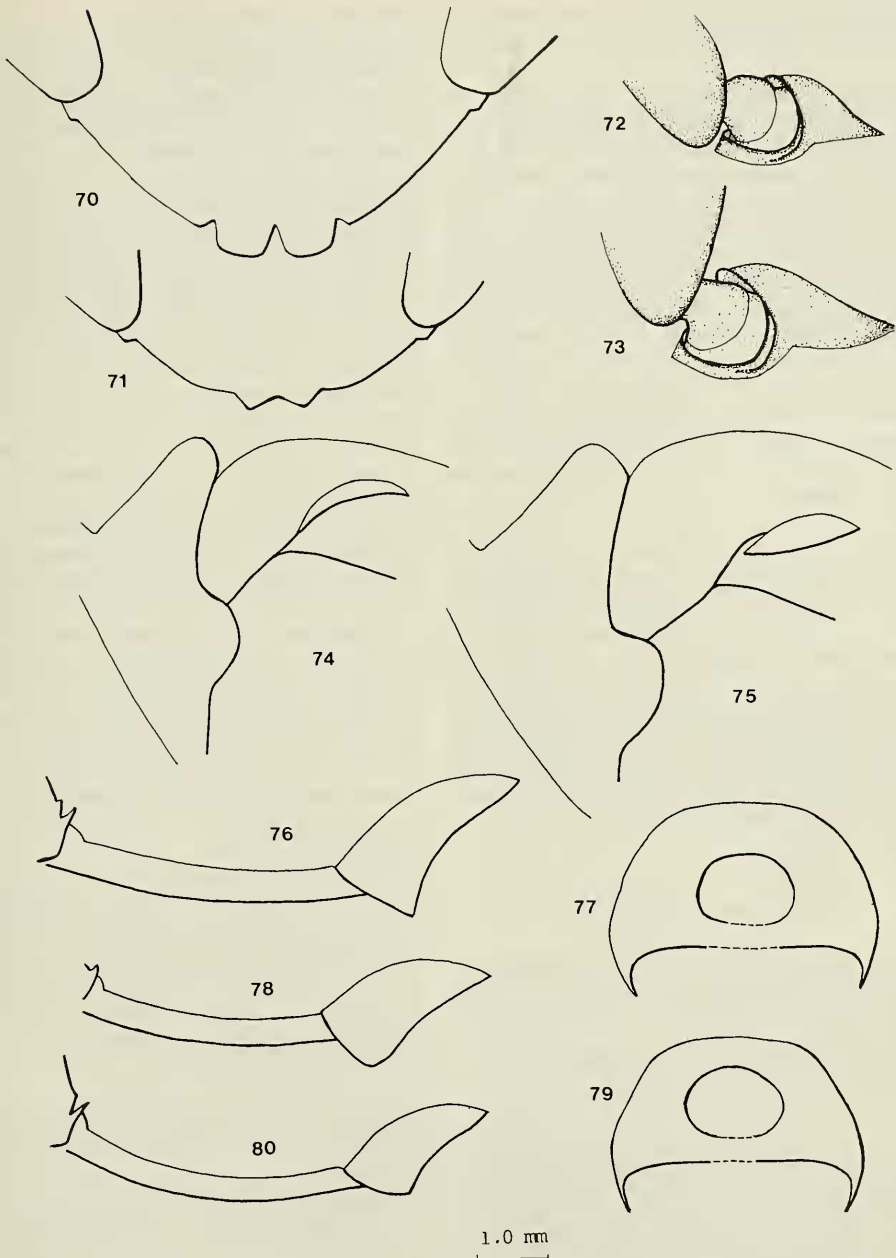
Sceliphron deforme nipponicum Tsuneki

(fig. 48)

Sceliphron deforme; Kohl, 1918: 123 (Hokodadi); Tsuneki & Shimoyama, 1963: 48 (Towada dist., Honshu); Tsuneki, 1964: 10 (Mt. Kujū, Sasebo, Kyushu).

Sceliphron deforme japonicum Tsuneki, 1971: 7 (♀) (nec *japonicum* Gribodo).

Sceliphron deforme nipponicum Tsuneki, 1972: 1, ♀ — Prov. Fukui (Iwaya), paratypes ♀ ♂, Fukui,



Figs. 70—80. *Sceliphron rufopictum* (Smith). 70, ♀, Indonesia, Celebes, clypeus; 71, ♂, Philippines, Luzon, clypeus; 72, *S. r. kalshoveni* ssp. n., ♀, holotype, antennal insertion; 73, *S. r. rufopictum* (Smith), ♀, antennal insertion; 74, *S. r. kalshoveni* ssp. n., ♀, holotype, pronotum, lateral aspect; 75, *S. r. laticinctum* ssp. n., ♀, holotype, pronotum, lateral aspect; 76—77, *S. r. rufopictum* (Smith), ♀; 76, first metasomal segment; 77, propodeal orifice; 78—80, *S. r. laticinctum* ssp. n.; 78, ♀, Philippines, Luzon, first metasomal segment; 79, ♀, Philippines, Luzon, propodeal orifice; 80, ♂, paratype, first metasomal segment. 70, 71, 76, 78, 80: scale-line; 74, 75: 2.0 × scale-line; 72, 73, 77, 79: 4.0 × scale-line.

several localities (coll. Tsuneki; not examined); Bohart & Menke, 1976: 106.

Description. — Female. — Post-antennal tubercles large, but distinctly smaller than in *S. d. atripes*, and not truncate dorsally; colour pattern (fig. 48) more or less like Eastern specimens of *S. d. atripes*; post-antennal tubercles black, scape dorsally black, subtegular spots small, basal propodeal spots absent; metasoma with the bands more or less darkened (brownish) and reduced; second to fifth sternite black; legs brownish black, with yellow streaks along fore and middle tibiae. The colour-pattern was described in full detail by Tsuneki (1971, 1972).

Male. — Like the female, but darker: clypeus sometimes entirely black, metasoma usually black, except for a narrow brownish band on the first tergite.

Material examined. — Japan. — Mt. Haku, 3 ♀, 1—2 Aug. 1953, 1 ♂, 1 Aug. 1962; 2 ♀, Fukui Pr., 8 Aug. 1953; 1 ♂, Nikko, 3 July 1952; 3 ♂ 3 ♀, Koike, Fukui, several dates; 2 ♂, Simoutinami, Fukui, 30 July 1971; 3 ♀, Arashi, Fukui, several dates; 1 ♀, Ichinose, Mt. Haku, 30 July 1964; 2 ♀, Hatogaya, Fukui, 29 Aug. 1969; all K. Tsuneki (RMNH); Tamba, 2 ♀, Yohoku, 23 July 1955, Higuchi, 1 ♀, Yakami, 23 July 1955, Honda, 1 ♂ 1 ♀, Sasayama, 15 July 1955 and 9 Sep. 1951, K. Iwata (all RMNH); 4 ♀, Japan, Smith coll. (BMNH).

Sceliphron fervens (Smith) (figs. 49—60, 117)

Pelopoens fervens Smith, 1858: 101, ♀ — Borneo, Sarawak, leg. Wallace (OUM; examined).

Sceliphron fervens; Turner, 1912: 196; Kohl, 1918: 130, fig. 28.

Sceliphron (Prosceliphron) fervens; Bohart & Menke, 1976: 106.

Type. — The lectotype, by present designation, is a female in the OUM with only the original Wallace-label "SAR". The BM possesses three paralectotypes with additional labels "*P. fervens* Smith" in Smith's handwriting. Two of these have been part of Smith's own collection, according to their label "F. Smith coll., 99—363", the third is labelled "57—36, Borneo".

Description. — Body length: ♀ 15.3—16.5 mm, ♂ 14.5 mm; length of forewing: ♀ 10.6—

11.9 mm, ♂ 9.6 mm. Pubescence greyish white, tomentum of face silvery.

Morphology: Female. — Clypeus with lateral incisions (fig. 49); post-antennal tubercles small (fig. 50); pronotum with median impression; mesoscutum with sharp transverse striation; laterally with some shallow punctation; propodeal orifice with narrow dorsal margin, like in *S. deforme*, but not evenly rounded (fig. 51); petiolus moderately long, distinctly curved (fig. 57), first tergite distinctly swollen, like in *S. deforme*. IFR 0.88—0.95; PTR 0.92—1.00; PR 0.09—0.10; TR 0.26—0.30; SR 0.76—0.82. **Male.** — In structural characters like the female, but clypeal margin laterally from the small, triangular lobes shallowly emarginate (fig. 52), like in *S. deforme*; petiolus longer and more strongly curved (fig. 55); genitalia similar to those of *S. deforme*, but volsellar plate more differentiated and gonostyles apically not so sharply pointed (fig. 53, 54); the difference in the digitus is probably an artifact due to dehydration. IFR 0.95; PTR 1.12; PR 0.12; TR 0.29; SR 0.63.

Coloration: scapes dorsally black, post-antennal tubercles black, upper subtegular spot larger than lower, basal spots of propodeum small or absent, legs mainly reddish, mesosoma often reddish on basal tergites, a distinct yellow band is only present on the third tergite, sometimes the second and fourth bear reduced bands; wings clear, with well-defined dark mark at apex of forewing.

Variation: In specimens from Malaysia, Sumatra and Java the red colour on the metasoma is restricted to the first tergite, (fig. 58), whereas in most specimens from Borneo it covers three or more tergites (fig. 59); the one specimen from Palawan I have seen has a pair of spots at the apex of the dorsal enclosure, and the femora are entirely reddish (fig. 60).

Distribution. — Southern Thailand, Malaysia, Sumatra, Bangka, W. Java, Borneo, Palawan (fig. 117).

Material examined. — Thailand. — 1 ♀, Satun, Thaleban Nat. Park, 26 July 1986, R. Hensen (CH).

Malaysia. — 1 ♀, Kedah, near Jitra, 8 April 1982, 1 ♀, Perak, Batang Padang, Jor Camp, 1800 ft., 3 ♀ 1 ♂, Kuala Lumpur, Gardens, 22 March 1941, all H. M. Pendlebury (BMNH, RMNH); 1 ♀, Taiping, W. B. Orme (BMNH); 1 ♀, Labuang Padang, July 1907, C. B. H. Hunt

(BMNH); 1 ♀, Kuala Lipis, 29 May 1928, Miller (BMNH); Penang, Batu Feringgi, catchment area, H. T. Pagden, 1 ♀, 14 Feb. 1957, 1 ♀, 15 Feb. 1961 (BMNH); 1 ♀, Ulucheka, in jungle, 10 Aug. 1928, Miller (BMNH).

Bangka. — 1 ♀, Bangka, Van den Bossche (RMNH).

Sumatra. — 1 ♀, S. Sumatra, Res. Benkoelen, Boekit-Item, 24 June—2 July, 1935, 650 m, M. E. Walsh (RMNH); 1 ♀, Muara Sako, Oct. 1915, E. Jacobson (USNM).

Java. — 2 ♀, Radjamandala, Dec. 1938, J. v. d. Vecht (RMNH); 1 ♀, Radjamandala, Djampang Wetan, Oct. 1936, 1200 ft., M. E. Walsh (RMNH); 1 ♀, Palaboean Ratoe, 16 April 1933, M. Lieftinck (RMNH).

Borneo. — 2 ♀, Bettotan, near Sandakan, 11 Aug. 1927 (BMNH); 1 ♀, E. Borneo, Ketapan, 50 m, June 1937, M. E. Walsh (RMNH); 1 ♀, Sarawak, Kampong Pueh, Lundu Dist., 690—1500 m, 25—31 May 1958, T. C. Maa (BPBM); ♀, S. E. Borneo, Wahnes S., Wolf v. Schönberg V. (ZMB).

Palawan. — 1 ♀, 3.2 km S. of Tarumpitao Pt., 31 May 1958, near jungle ravine, H. E. Milliron (USNM).

***Sceliphron coromandelicum* (Lepeletier)**
(figs. 61—69, 115)

Pelopoëus coromandelicus Lepeletier, 1845: 306, ♀ — Coromandel (coll. Spinola, MZU).

Sceliphron coromandelicum; Dutt, 1912: 216—221, pl. XII, figs. 1, 7 (bionomics at Pusa, India); Field, 1914: 378—379 (bionomics); Strand, 1915: 91 (Sri Lanka); Kohl, 1918: 125, 126 (♀ ♂).

Sceliphron (*Prosceliphron*) *coromandelicum*; Van der Vecht & Van Breugel, 1968: 192 (type-species of *Prosceliphron*); Bohart & Menke, 1976: 106.

Type. — The Spinola-collection (MT) contains one female of this species, standing under the label "*Pelopoëus coromandelicus* m. et Lep.", which is most probably the holotype, since the description seems to be based on one specimen. Van der Vecht (pers. comm.) saw the specimen several years ago, and confirmed the general interpretation of the species, on which Kohl (1918) was not sure. The type is in poor condition, the head and mesosoma have been damaged severely by *Anthrenus*.

Description. — Body length: ♀ 17.4—21.0 mm, ♂ 16.4—19.5 mm; length of forewing: ♀ 11.9—13.3 mm, ♂ 10.8—11.7 mm. Pubescence: long, erect pubescence of head and mesosoma dark brown or black, but sometimes discolored

to pale brown in older specimens, short pubescence as usually white; tomentum of face silvery.

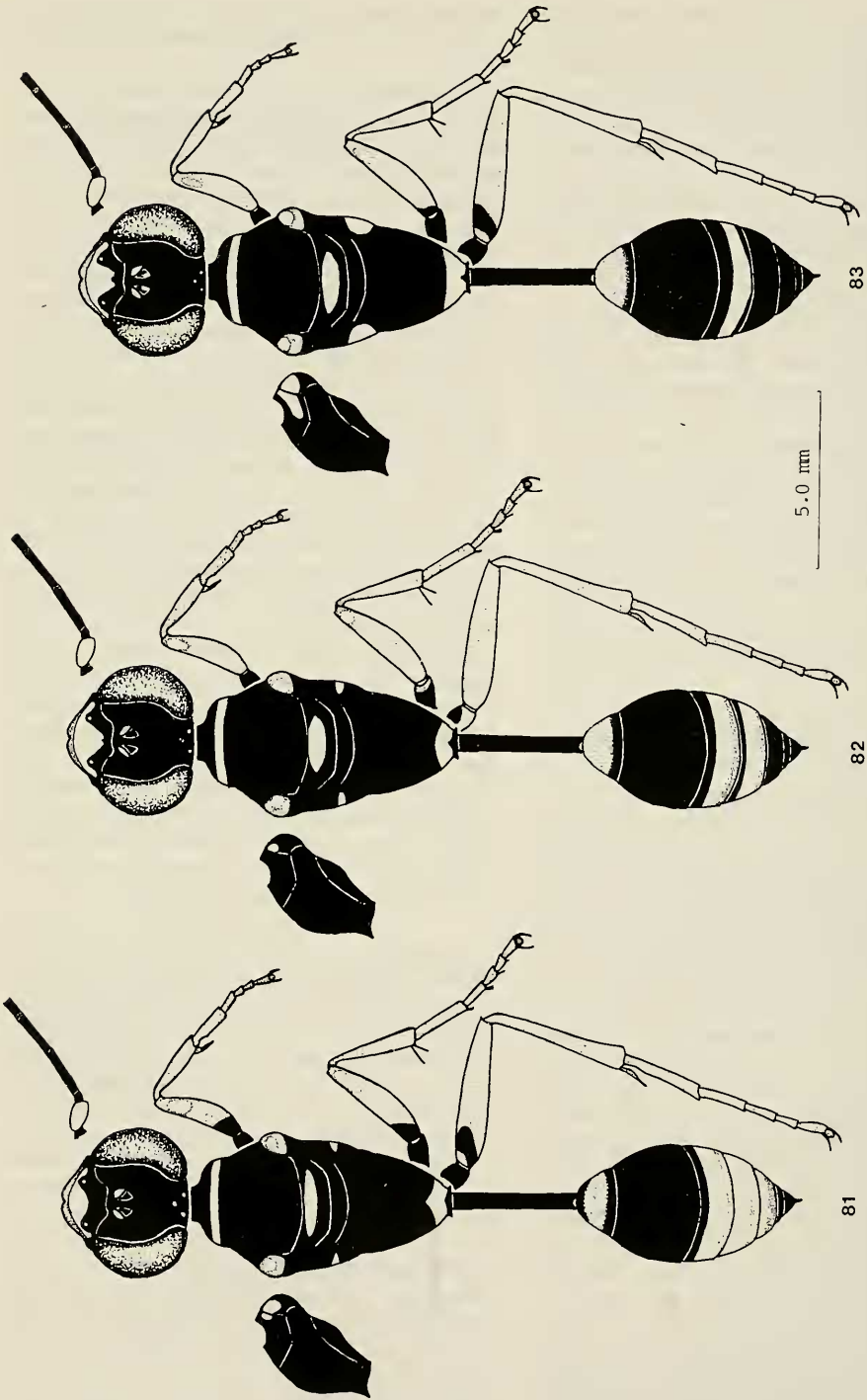
Morphology: Female. — Clypeus with small lateral incisions (fig. 65); post-antennal tubercles very small (fig. 63); pronotum with median impression, rather broad in lateral view (fig. 69); mesoscutum strongly transversely striate, only laterally with some shallow punctures; dorsal margin of propodeal orifice narrow (like in *S. deforme*), but not evenly rounded (fig. 64); petiolus long, sometimes as long as in *S. funestum*, but always distinctly curved (fig. 68). IFR 0.90—0.96; PTR 0.86—0.91; PR 0.05—0.08; TR 0.14—0.18; SR 0.67—0.74. Male. — Like the ♀, but clypeus evenly rounded, with small, triangular apical lobes (fig. 66); genitalia (fig. 61, 62); pubescence of cuspis dense, but shorter than in *S. rufopictum* and *S. formosum*, volsellar plate reduced, gonostyle with comparatively long and dense pubescence, the lamellae of the gonostyle are rather narrow. IFR 1.00—1.05; PTR 0.97—1.00; PR 0.07—0.08; TR 0.16—0.20; SR 0.51—0.66.

Coloration: Black; the following parts are yellow: two spots on the clypeus (often coalescent); ventral side of scape, more or less developed band on pronotum (absent in specimens from Malaya), very small subtegular spots; rarely a small spot on the scutellum and at apex of the propodeum; petiolus yellow, legs reddish yellow, except coxae, trochanters, base of fore and middle femora and terminal tarsomeres (hind tibiae black in a specimen from Laos).

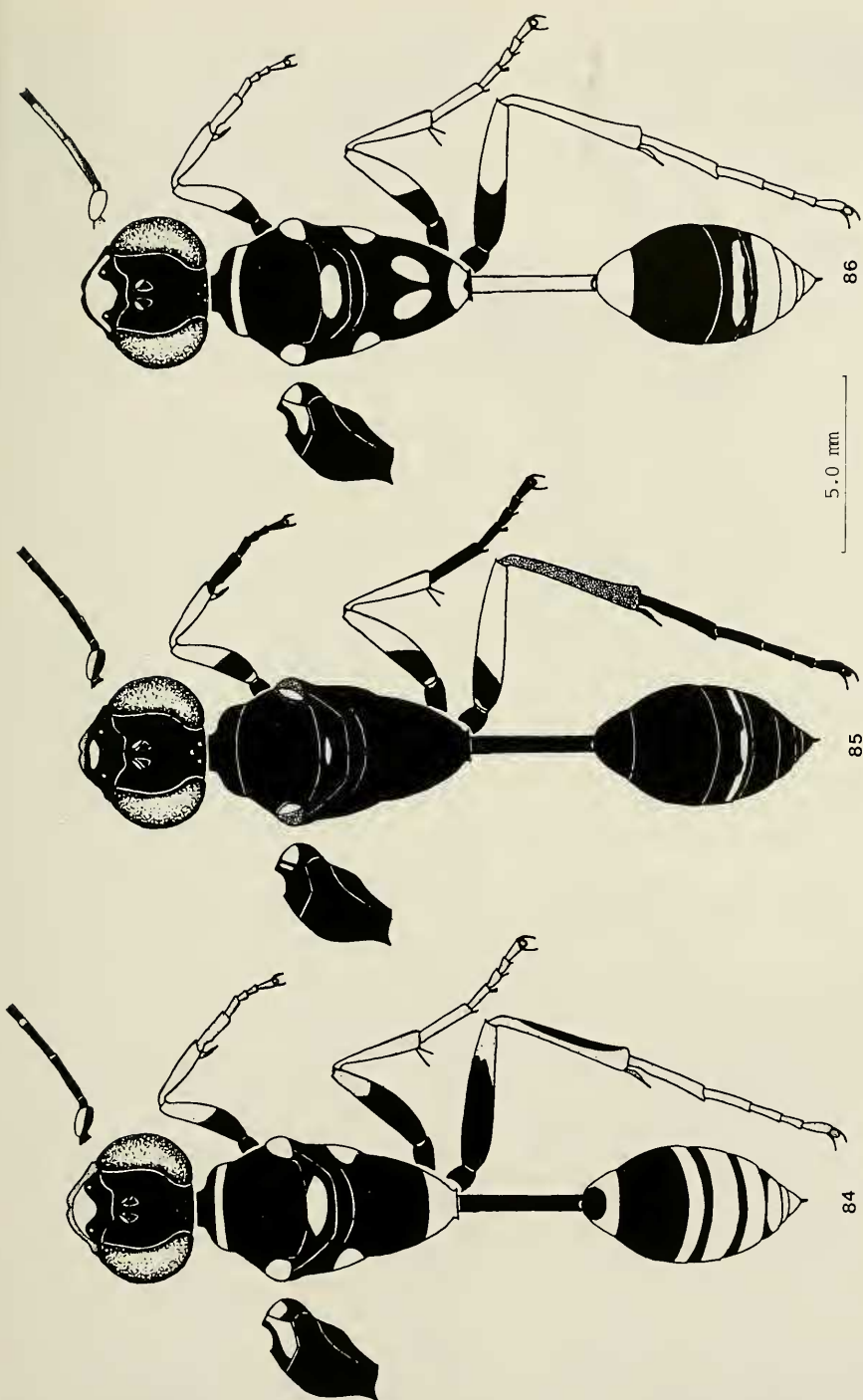
Distribution. — India, Sri Lanka, Bangladesh, Burma, Thailand, Laos, Malaya (fig. 115). *S. coromandelicum* is at present the only species known to occur sympatrically with several other *Prosceliphron*-species: with *S. fervens* in Malaya, with *S. deforme femorale* in Thailand and Laos, with *S. deforme tibiale* and *S. rectum* in Northern India.

The ZMA possesses a series of 15 ♀ 2 ♂ from Coimbatore, India, which is almost completely stylized.

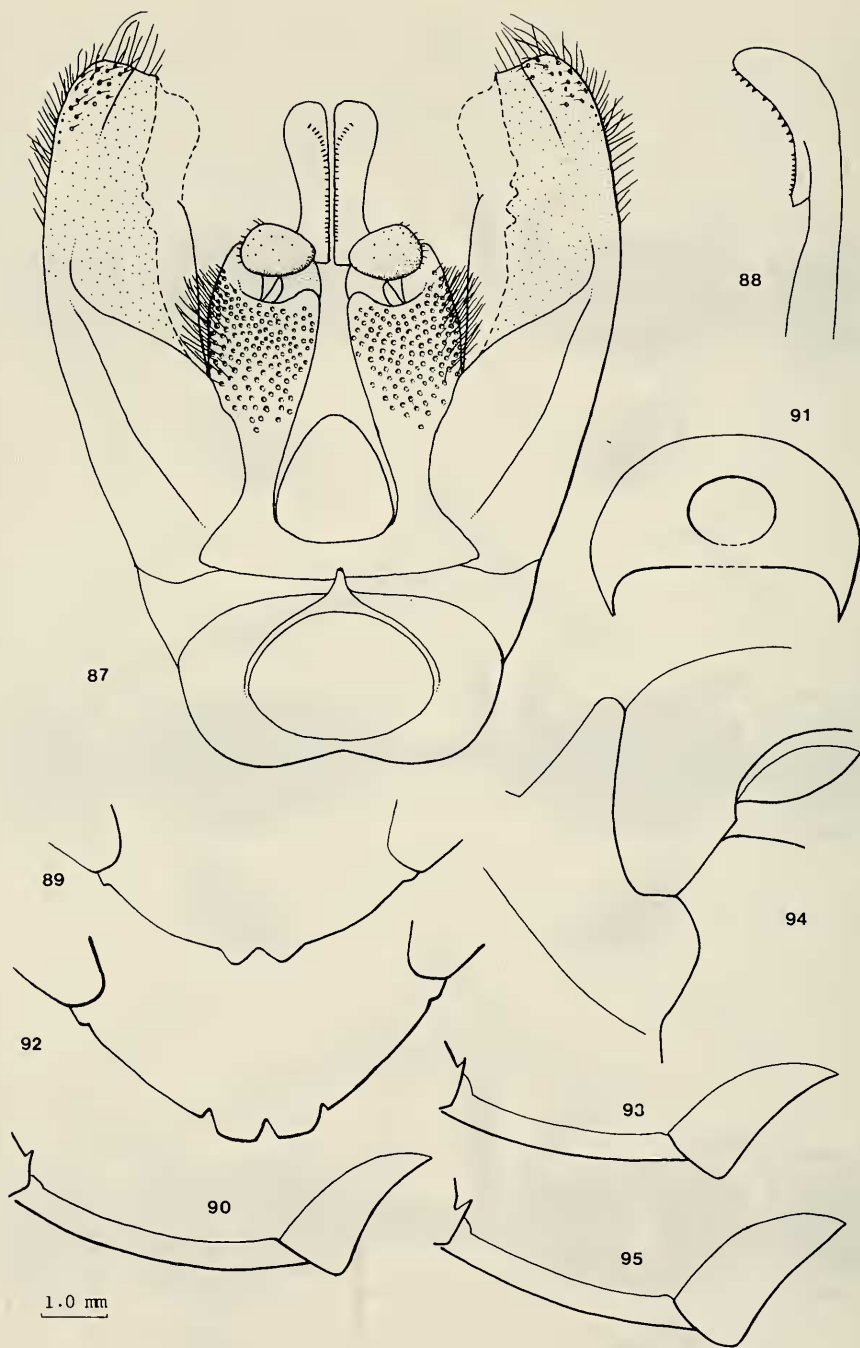
Material examined. — Sri Lanka. — 1 ♀, Puwakpitiya, Hiver 1906—7, E. Bugnon (MNHN); 1 ♀, Mon. Dist., Bibile, 7 June 1975, S. L. Wood & J. L. Petty (USNM); 1 ♀, Gal Dist., Kanneliya, 24—26 Jan. 1979, 1 ♀, Tri. Dist., Trincomalee, 0—100 ft., 13—17 May 1976, 2 ♀, Col. Dist., Labugama Res., 110 m, 29 Oct. 1977 and 11 July 1978, 1 ♀, Rat. Dist.,



Figs. 81—83. *Sceliphron rufopictum* (Smith), colour patterns. 81, *S. r. kalsboveni* ssp. n., ♀, Indonesia, Java; 82, *S. r. bitinctum* Van der Vecht, ♀, Indonesia, Sumba; 83, *S. r. rufopictum* (Smith), ♀, Indonesia, Celebes.



Figs. 84—86, 84, *Sceliphron rufopictum laticinctum* ssp. n., ♀, holotype, colour pattern; 85, *Sceliphron unifasciatum* (Smith), ♀, Indonesia, Morotai, colour pattern; 86, *Sceliphron f. formosum* (Smith), ♀, Australia, Queensland, colour pattern.



Figs. 87—95. 87—90. *Sceliphron murarium* (Smith), ♂, Indonesia, Ambon; 87, genitalia, ventral aspect; 88, inner side of left half of aedeagus; 89, clypeus; 90, first metasomal segment; 91—93, *S. murarium* (Smith), ♀, Indonesia, Ambon; 91, propodeal orifice; 92, clypeus; 93, first metasomal segment. 94—95, *Sceliphron unifasciatum* (Smith), ♀, Indonesia, Obi; 94, pronotum, lateral aspect; 95, first metasomal segment. 89, 90, 92, 93, 95; scale-line; 94: 2.0 × scale-line; 91: 4.0 × scale-line; 87, 88: 8.0 × scale-line.

Uggalkaltota, 23—26 June 1978, 1 ♀, Bad. Dist., Ulhitiya, 15 mi. NNE of Mahiyangana, 5—6 Sep. 1980, all leg. K. V. Krombein (USNM); 1 ♀, Rat. Dist., Udawalaya, 5—6 June 1975, D. H. Messersmith e.a. (USNM); 1 ♀, Col. Dist., Kollupitiya, 21—22 Nov. 1978, G. Ratnaweera (USNM); 1 ♀, Kantalai, 29 June 1953, F. Keiser (RMNH); 1 ♀, Col Dist., Labugama Res., 400 ft., 2—3 Oct. 1976, G. F. Hevel (RMNH); 1 ♀, Gal. Dist., Kanneliya, 28 July 1973, 300 ft., G. Ekis (RMNH); 1 ♀, M. Illupala, Jan. 1912, Butt.-Repp (ZMB); 1 ♀, Bibile, Bad. Dist., 1 ♀, Ruhuan Nat. Park, 5 Aug. 1963, both Univ. London Ceylon Exp. (BMNH).

India. — 3 ♀, Nilgiri Hills, Singara, 3400 ft., June 1948, 1 ♀, Walayar Forest, 100 ft., 18 Oct. 1947, 1 ♀, Kurumbagaram, 12 June 1947, 1 ♀, Coimbatore, Nov. 1950, all P. S. Nathan (USNM); 1 ♀, Balasore, R. Oberthür, 1898 (MNHN); 1 ♀, Mahé, Aug. 1892 (MNHN); 1 ♀, Ostindien, Dald (ZMB); 4 ♀ 1 ♂, Lonavla, W. Ghats, 650 m, 1 ♂, Sinhagad, near Poona, 1320 m, all May 1963, F. Wain (RMNH); 1 ♀, Sangli (MBUD); 1 ♀, Calcutta, 6 June 1944, D. E. Hardy (USNM); 1 ♀, Karikal, Nov. 1961, P. S. Nathan (LACM); 1 ♀, Bangalore, 1894, Bingham (USNM); 7 ♀, Coimbatore, 1400 ft., 2 ♀, Anamalai Hills, Chinchona, 3500 ft., 1 ♀, Walayar Forest, 700 ft., all April-May 1960, P. S. Nathan (RMNH); 2 ♀, Orissa, 11 April 1965, S. D. Jayakar & H. Spurway (RMNH); 1 ♀, Khasia, 1 ♀, Bengalen, 1 ♀, Karivar, 6 Aug. 1907 (all RMNH); 1 ♀, Bengal (TMA); 15 ♀ 2 ♂ Coimbatore, 500 m, 7 April 1970, R. T. Simon Thomas (ZMA; 2 ♀ CH); Coimbatore, 425 m, 2 ♀, July 1963, 1 ♀, Nov. 1962, 1 ♀, April 1964, all P. S. Nathan (ZMA); 2 ♀, Karaikkal, June-July 1964, P. S. Nathan (ZMA); 6 ♀, Barrackpore, Rothney (OUM); 5 ♀, Bombay, W. Ghats, Mathera, Charlotte Lake, 1 April 1908, G. B. Longstaff (OUM); 1 ♂, India, 5 May 1909, E. Brunetti (BMNH); 2 ♀, Bombay, Matheran or Mableshwar, I. Newton (BMNH); 1 ♀, Coimbatore, 1925 (BMNH); 1 ♀, Thekkadi, Periyar Dam, Oct. 1938 (BMNH); 1 ♀, N. Khasia Hills (BMNH); 2 ♀, Coimbatore, June 1935, P. S. Nathan (BMNH).

Burma. — 10 ♀ 1 ♂, Rangoon Dist., 1 ♂, Tenasserim, Taungoo, all coll. Bingham (ZMB).

Thailand. — 1 ♀, Lee, 22 July 1952, D. & E. Graham (USNM); 1 ♀, near Metah Valley, J. D. H. Hedley (BMNH).

Laos. — 1 ♀, Sedone Prov., Pakse (15°10' N, 106°00' E), 15 Aug. 1967, native coll. (RMNH);

1 ♀, Indochine Francaise, Vitalis de Salveza, Mme A. Vuillet, 1920 (MNHN); 1 ♀, Vientiane, 30 April 1967, native coll. (BPBM).

Malaya. — 7 ♀ 4 ♂, Penang, ex nido, April 1966, H. T. Pagden (BMNH, RMNH); 1 ♂, with part of nest, from gun barrel, 21 Oct. 1980 (BMNH).

Sceliphron rufopictum (Smith)

(figs. 70—84, 96—97, 117)

Description. — Pubescence: Erect pubescence of head and mesosoma yellowish, tomentum of face pale-golden.

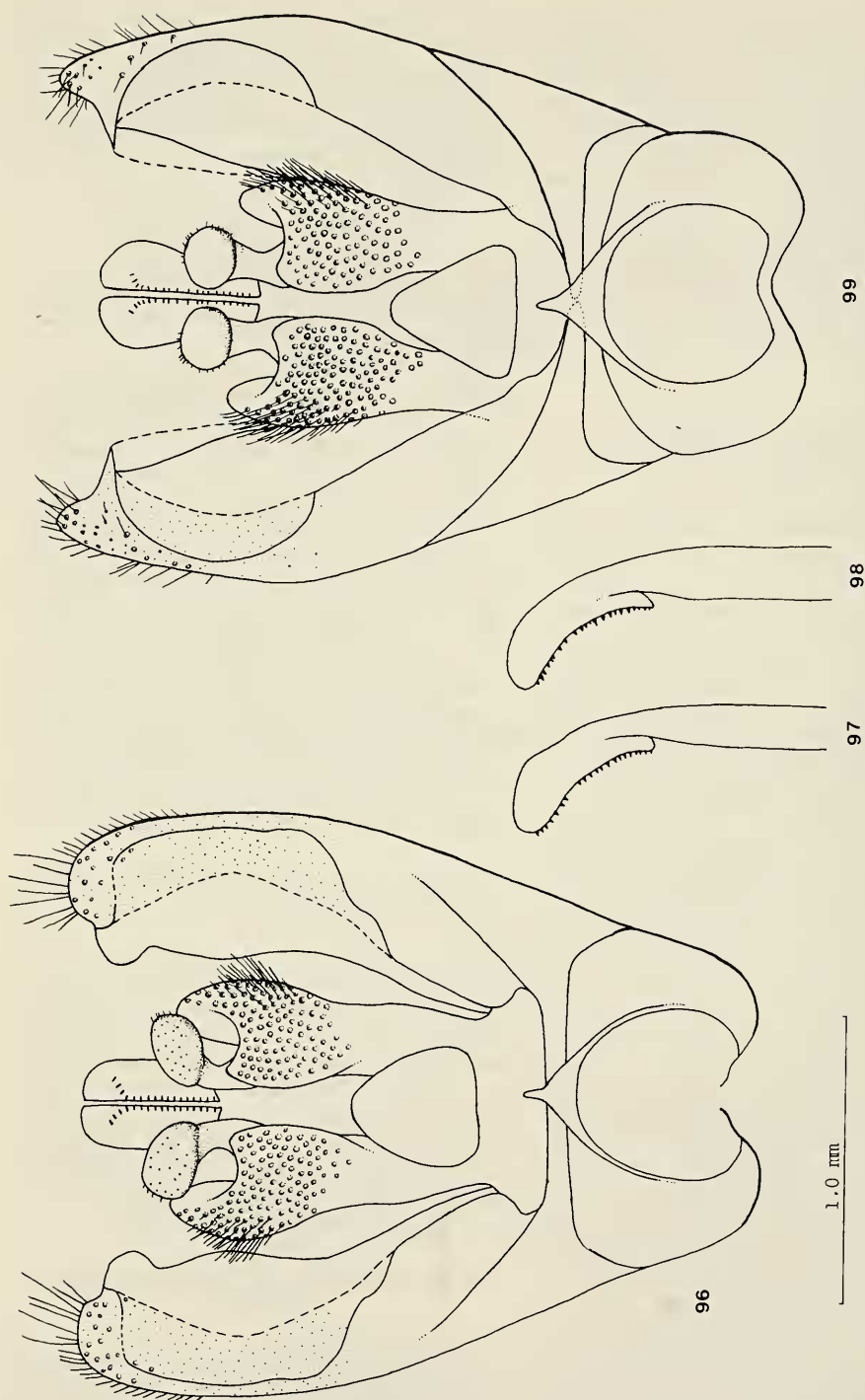
Morphology: Female. — Clypeus with lateral incisions (fig. 70); post-antennal tubercles variable in size; vertex sometimes raised; interocular distance at vertex shorter than or equal to length of first flagellomere; pronotal collar variable (figs. 74, 75); mesoscutum sharply transversely striate, only laterally with shallow punctation; propodeal orifice with broad dorsal margin, which is generally brownish translucent (figs. 77, 79); petiolus distinctly curved, shorter than hind tibia, first tergite moderately long, not swollen (figs. 76, 78). Male. — Similar to the female, but clypeus rounded, with small, triangular lobes (fig. 71); petiolus longer than hind tibia (fig. 80); genitalia (figs. 96, 97): gonostyles apically rounded, and with broad lamellae, cuspis with rather dense and long pubescence laterally, volsellar plate rounded triangular.

Distribution. — Sunda-islands from Eastern Java to Flores, Celebes, Philippine Islands (fig. 117).

Four subspecies can be distinguished, differing in colour pattern as well as in a number of structural characteristics: 1) the size of the post-antennal tubercles, 2) the swelling of the ocellar area, 3) the broadness and median impression of the pronotum. These characters appear to vary clinally from South to North. Recognition of these clines led me to regard the geographic forms as conspecific. No conclusions could be drawn out of male genital structure, since only one male specimen was available.

Key to the subspecies of *Sceliphron rufopictum* (Smith)

1. Post-antennal tubercles rather large (fig. 73), sometimes with yellow spot; subtegular and basal propodeal spots large (fig. 83, 84) 2
- Post-antennal tubercles small (fig. 72),



Figs. 96—99. 96—97. *Sceliphron rufopictum laticinctum* ssp. n., ♂, paratype; 96, genitalia, ventral aspect; 97, inner side of left half of aedeagus; 98—99, *Sceliphron formosum ocellare* Kohl, ♂, Solomon Islands, Guadalcanal; 98, inner side of left half of aedeagus; 99, genitalia, ventral aspect.

- black; subtegular and basal propodeal spots generally small 3
2. Vertex raised behind anterior ocellus; usually tergites 2—5 with complete yellow band, antennal scape dorsally black; Philippine Islands *laticinctum* ssp. n.
- Vertex not or hardly raised; only third tergite with distinct apical band, antennal scape reddish dorsally; Celebes *rufopictum* (Smith)
3. Fifth tergite with yellow band, base of femora black (Java) or femora entirely reddish (Flores) *kalshoveni* ssp. n.
- Fifth tergite black, femora totally reddish; Sumba *bicinctum* Van der Vecht

***Sceliphron rufopictum kalshoveni* ssp. n.**
(figs. 72, 74, 81, 117)

Holotype. — ♀, M. Java, S. Coast, Patjitan, 12 Dec. 1937, J. van der Vecht (RMNH).

Description. — Body length 16.6 mm, length of forewing 10.7 mm.

Morphology. — Post-antennal tubercles small (fig. 72); ocellar area hardly raised; pronotal collar narrow (fig. 74), with distinct median impression; propodeal orifice rounded, upper margin very broad (cf. fig. 77).

Coloration. — Black; the following parts are yellow: broad spot on clypeus, antennal scapes, dorsal band on pronotum, spots on the tegulae, small subtegular spots, transverse spot on scutellum, very small basal propodeal spots, triangular mark at apex of propodeum, first metasomal tergite, and bands on tergites 2—5; legs light reddish, base of femora black, yellow spots at apex of fore and middle femora, yellow lines anteriorly on fore and middle tibiae (fig. 81).

Paratypes. — Java. — 1 ♀, Gedangan, 8 Sep. 1939, P. A. Blijdorp; 2 ♀, Gedangan, 18 Feb. 1933, Kalshoven; 1 ♀, Djati Rogo, Djati Forest, 100 m, M. E. Walsh; 1 ♀, Midden Java, with nest, Kalshoven (all RMNH).

Karimun Djawa Islands. — 2 ♀, 22—30 Nov. 1930, M. A. Lieftinck.

Not paratypes: Flores. — 2 ♀, W. Flores, Pater Verheyen, no. 116 (RMNH).

Variation. — Body length 16.6—18.8 mm, length of fore wing 10.8—12.3 mm; IFR 0.89—0.95; PTR 0.82—0.90; PR 0.04—0.07; TR 0.13—0.19; SR 0.76—0.84. The specimens from Flores have the femora entirely reddish,

and the basal propodeal spots and the subtegular spots are comparatively large. These specimens are probably transitional between the subspecies *S. r. rufopictum*, *r. kalshoveni*, and *r. bicinctum*.

***Sceliphron rufopictum bicinctum* Van der Vecht**
(figs. 82, 117)

Sceliphron deforme bicinctum Van der Vecht, 1957: 370, ♀ — Sumba (Museum Basel; not examined).

Sceliphron (Prosceliphron) deforme bicinctum; Bohart & Menke, 1976: 106.

Description. — Body length 17.4—18.0 mm, length of forewing 11.0—11.2 mm.

Morphology. — Post-antennal tubercles small (cf. fig. 72); vertex not raised; pronotal collar with distinct median impression (cf. fig. 74); propodeal orifice rounded, with broad dorsal margin (cf. fig. 77). IFR 0.93—0.95; PTR 0.85—0.87; PR 0.07; TR 0.16—0.20; SR 0.71—0.75.

Coloration. — Post-antennal tubercles black, antennal scapes yellow, subtegular spots and basal propodeal spots small, femora, tibiae and tarsi reddish, first tergite reddish, third and fourth tergite with yellow apical band (fig. 82).

Material examined. — Sumba. — 1 ♀, W. Sumba, Pogobina, 16 Sep. 1949, 1 ♀, O. Sumba, Laluku, 4—7 July 1949, both leg. Dr Bühler & Dr Sutter (paratypes, RMNH).

***Sceliphron rufopictum rufopictum* (Smith)**
(figs. 73, 76—77, 83)

Pelopoens rufopictus Smith, 1856: 232, ♀ — Celebes (BMNH; examined).

Pelopoens flavo-fasciatus Smith, 1859: 15, ♀ — Celebes, leg. Wallace (OUM; examined).

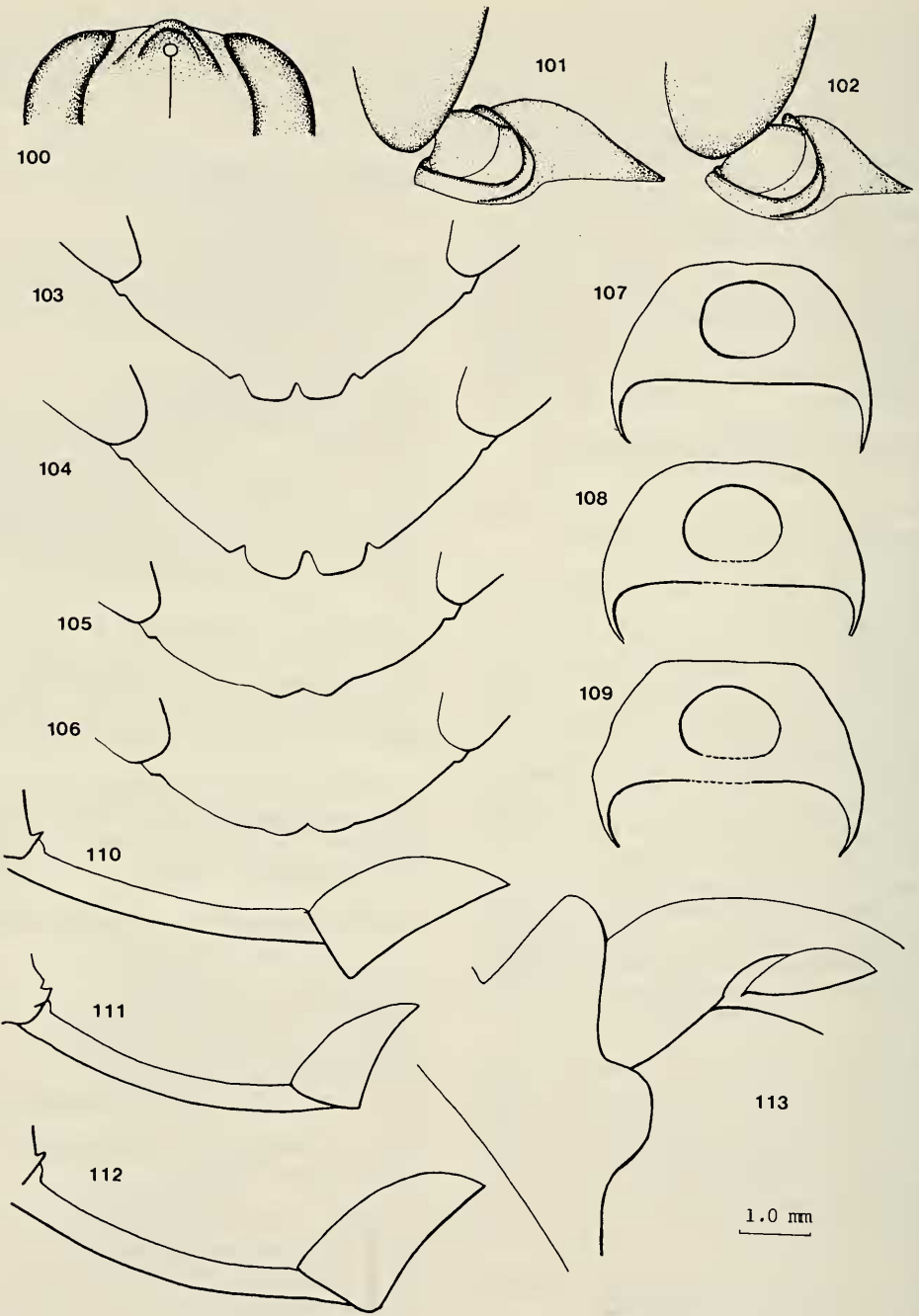
Sceliphron rufopictum; Kohl, 1918: 129.

Sceliphron deforme rufopictum; Van der Vecht, 1957: 370.

Sceliphron (Prosceliphron) deforme rufopictum; Bohart & Menke, 1976: 106.

Types. — The lectotype of *P. rufopictus* Smith, by present designation, is a female labelled "Celebes, 55/22" in the BMNH, which is the only specimen old enough, according to label data, and which fits the original description. Previously a specimen with label "China, 56/45", belonging to *S. d. deforme* (Smith), was erroneously marked as the type.

The lectotype of *P. flavofasciatus* Smith, by present designation, is a female with labels



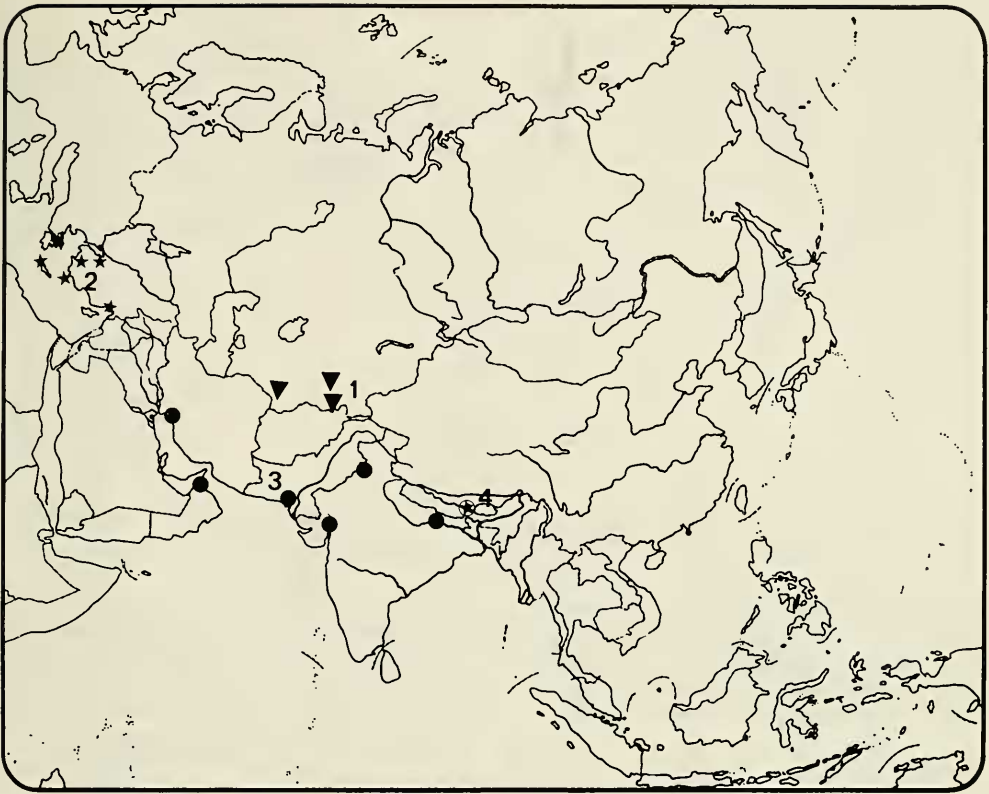


Fig. 114. Distribution of (1) *Sceliphron shestakovi* Gussakovskij, (2) *Sceliphron funestum* Kohl, (3) *Sceliphron rectum pulchellum* Gussakovskij, and (4) *Sceliphron r. rectum* Kohl.

"Celebes" and "*Pelopoëus flavo-fasciatus* Smith" (Smith's handwriting) in the OUM. Paralectotypes are 2 ♀ with labels "Mak" (Makassar) (Wallace's handwriting) and "*Pelopoëus flavofasciatus* Smith" (Smith's handwriting) (BMNH and OUM). The specimen in the BMNH is additionally labelled "F. Smith coll., BM 79—22" and is stylized.

Description. — Body length 17.8—21.6 mm, length of forewing 11.4—13.7 mm.

Morphology. — Post-antennal tubercles rather large; vertex sometimes slightly raised behind anterior ocellus; pronotal collar with distinct median impression, rather broad in lateral view (fig. 75); dorsal margin of propodeal orifice rounded and broad (cf. fig. 77). IFR 0.84—0.96; PTR 0.76—0.85; PR 0.05—0.08; TR 0.14—0.18; SR 0.80—0.86.

Coloration. — Antennal scapes yellow; post-antennal tubercles usually with yellow spot;

Figs. 100—113. *Sceliphron formosum* (Smith). 100—101, *S. f. ocellare* Kohl, ♀, Solomon Islands; 100, upper part of head; 101, antennal insertion; 102, *S. f. formosum* (Smith), ♀, Australia, Queensland, antennal insertion; 103—106, clypeus; 103, *S. f. formosum* (Smith), ♀, Australia, Queensland; 104, *S. f. bruinjii* (Maindron), ♀, N.W. Nw. Guinea; 105, *S. f. formosum* (Smith), ♂, Australia, Queensland; 106, *S. f. ocellare*, ♂, Solomon Islands; 107—109, propodeal orifice; 107, *S. f. formosum*, ♀, Australia, Queensland; 108, ♀, *S. f. ocellare* (Kohl), ♀, Solomon Islands; 109, *S. f. bruinjii* (Maindron), ♀, Indonesia, New Guinea; 110—112, first metasomal segment; 110, *S. f. formosum* (Smith), ♀, Australia, Queensland; 111, 112, *S. f. ocellare* Kohl, ♂, Solomon Islands, 111, Nygela, 112, Guadalcanal; 113, *S. f. ocellare* Kohl, ♀, Solomon Islands, Malaita, pronotum, lateral aspect. 103—106, 110—112, scale-line; 100: 0.5 × scale-line; 113: 2.0 × scale-line; 101, 102, 107—109: 4.0 × scale-line.

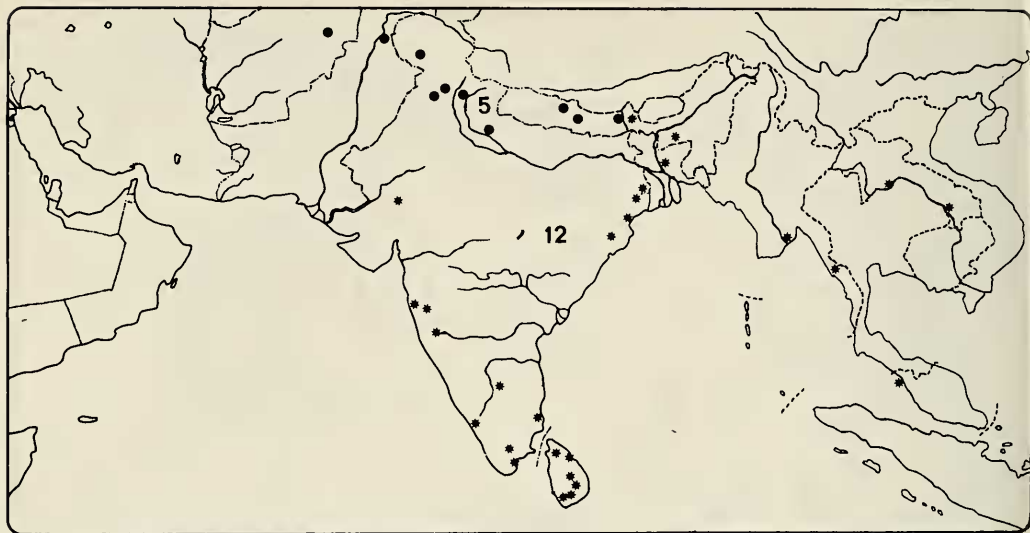


Fig. 115. Distribution of (5) *Sceliphron curvatum* (Smith), and (12) *Sceliphron coromandelicum* (Lepeletier).

subtegular and basal propodeal spots large; dorsal enclosure of propodeum sometimes with a pair of spots (N. Celebes); first tergite reddish, third with a broad yellow band apically; femora, tibiae and tarsi entirely reddish (fig. 83).

Material examined. — Celebes. — 1 ♀, Bua Kraeng, 5000 ft., Feb. 1896, 1 ♀, Samanga, Nov. 1895, both H. Frühstorfer (NMW); 1 ♀, Patunuang, Jan. 1896, H. Frühstorfer (ZMB); 1 ♀, Toelabella, Rosenberg (RMNH); 1 ♀, Lompoh Batang, 200 m, 1941, H. Lucht (RMNH); 2 ♀, Manado, June and Aug. 1941, F. Dupont (RMNH); Bantimurung, 1 ♀, 3 Oct. 1931, J. van der Vecht, 1 ♀, July 1949, C. J. H. Franssen, 1 ♀, G. Ribbe, 1882 (all RMNH); 1 ♀, Loka, 1200 m, C. J. H. Franssen (RMNH).

***Sceliphron rufopictum laticinctum* ssp. n.**
(figs. 75, 78—80, 84, 96—97)

Sceliphron deformis; Williams, 1919: 122, fig. 59 (Luzon, bionomics); Rohwer, 1921: 675 (Luzon).

Holotype. — ♀, Los Baños, Philippine Isl., July-Aug. 1917, F. X. Williams coll. (RMNH).

Description. — Body length 18.3 mm, length of forewing 12.0 mm.

Morphology. — Post-antennal tubercles rather large, shiny (fig. 73); vertex moderately

raised behind anterior ocellus; pronotal collar evenly rounded, without traces of a median impression, rather broad in lateral view (fig. 75); mesosoma more regularly and finely sculptured than in the other subspecies, and more shiny, particularly the mesopleuron; propodeal orifice more or less trapezoid in outline, dorsal margin broad and brownish translucent (fig. 79).

Coloration. — Black, the following parts yellow: large spot on clypeus, scapes ventrally, broad band on pronotum, large transverse spot on scutellum, large subtegular spots, small spots on tegulae, basal spots and apical spot on propodeum, first metasomal tergite, except on the middle, apical bands on tergites 2—5 (the one on the second tergite less strong), faint bands on sternites 2—5; reddish are all tibiae, tarsi, and the apical 2/5 of the femora, but the last tarsomeres are infuscated, and the fore and middle tibiae bear a yellow stripe anteriorly. The colour-pattern is illustrated in fig. 84.

Measurements (entire type-series). — Body length 16.0—20.0 mm, length of forewing 10.8—13.0 mm; IFR 0.82—0.87; PTR 0.80—0.89; PR 0.08—0.09; TR 0.17—0.23; SR 0.76—0.88.

Male. — Body length 15.8 mm, length of forewing 10.6 mm. IFR 0.81; PTR 1.02; PR

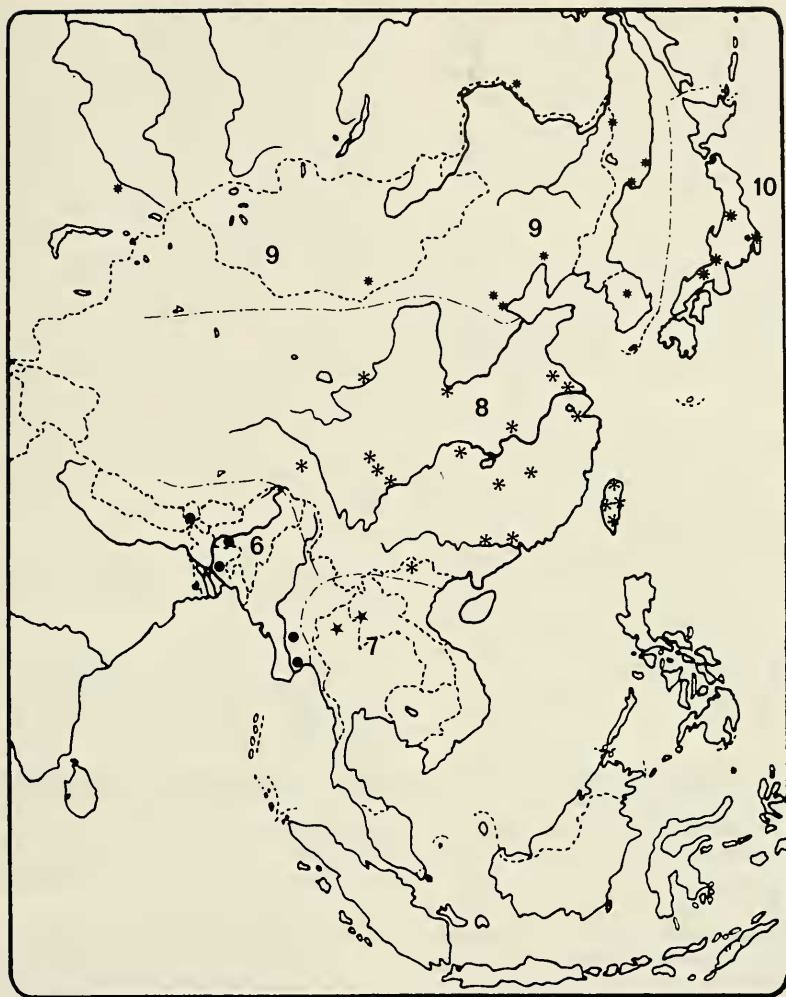


Fig. 116. Distribution of the subspecies of *Sceliphron deforme* (Smith): (6) *S. d. tibiale* Cameron, (7) *S. d. femorale* ssp. n., (8) *S. d. deforme* (Smith), (9) *S. d. atripes* (Morawitz), and (10) *S. d. nipponicum* Tsuneki.

0.10; TR 0.17; SR 0.60. Morphologically like the ♀, coloration see below (specimen from Cebu).

Paratypes. — Luzon. — Los Baños, 1 ♀, 23 Sep. 1915, V. S. Sulit; 1 ♀, 20 July 1921, C. Manuel, 2 ♀, 7 Sept. and 8 Nov. 1953, Townes Family, 1 ♀, 30 May 1954, H. & M. Townes, (all RMNH); 1 ♀, Limay, Bataan, Sep. 1920, 1 ♀, Camalia, Albay, 26 Aug. 1893, A. E. Bigornia, 1 ♀, Mt. Maquiling, 3 Feb. 1954, M. Delfinado, 1 ♀, Altimonan, Quezon, July 1963, A. Concepcion (all RMNH); 1 ♀, Montalban, Baker, 2 ♀, Mt. Maquiling, Baker (all USNM).

The following specimens are not included in the type-series. They originate from other islands of the Philippine Archipelago, and exhibit constant differences in colour-pattern. The specimens from Mindanao may even be regarded as transitional between *S. r. rufopictum* and *S. r. laticinctum*.

Samar. — 5 ♀, Island Samar, Baker (USNM). (With more or less distinct median impression on pronotum; antennal scape with narrow longitudinal black line dorsally; femora to a larger extent reddish).

Cebu. — 1 ♀ 1 ♂, Camp 7.25 km W. Cebu City, 21–29 Sep. 1965, D. Davis, 400 m

(USNM). (Pronotal collar with median impression, antennal scape with black line dorsally, only third tergite with distinct apical band; first and second tergite of male partly reddish, fore and middle tibiae of male posteriorly black).

Biliran. — 1 ♀, Island Biliran, Baker (USNM). (Hind tibiae reddish, broad band on second tergite).

Mindanao. — 4 ♀, Dapitan, Baker (USNM); 1 ♀, Davao, April 1927, M. C. Gregory (BMNH). (Distinct median impression on pronotum, large yellow spots on fore and middle femora and large spots on dorsum of propodeum (like *S. r. rufopictum*-specimens from North Celebes)).

Sceliphron murarium (Smith)

(figs. 87—93, 117)

Pelopoëus murarius Smith, 1863: 34, ♀ — Ceram, leg. Wallace (OUM; examined).

Pelopoëus rufipes Mocsary, 1883: 24, ♀ — Ambon (TMA; not examined) (nec *rufipes* Fabricius, 1804).

Sceliphron mocsaryi Dalla Torre, 1894: 388 (new name for *P. rufipes* Mocsary).

Sceliphron rufipes; Kohl, 1918: 131.

Sceliphron (Prosceliphron) fervens murarium; Bohart & Menke, 1976: 106.

Type. — In the Saunders-collection (OUM) two specimens are standing under this species. One of these is a female with labels "Cer." and "*Pelopoëus murarius* Smith" (Smith's handwriting). This specimen is the lectotype by present designation. The other specimen belongs to *S. formosum bruinjii* (Maindron) and is a male, labelled "N." and "*Pelopoëus murarius* Smith male?" (Smith's handwriting). It was evidently not part of the original type-series.

Description. — Body length: ♀ 17.8—21.0 mm, ♂ 16.8—17.7 mm; length of forewing: ♀ 12.5—14.0 mm, ♂ 11.5—12.1 mm. Pubescence: erect pubescence of head and mesosoma dark brown; tomentum of face golden.

Morphology: Female. — Clypeus with lateral incisions (fig. 92); post-antennal tubercles very small (cf. fig. 50); vertex not raised; pronotum with distinct median impression, high and narrow in lateral view, like in *S. unifasciatum* (fig. 94); mesonotum sharply transversely striate, only laterally with a trace of punctation; propodeal orifice nearly circular in outline, dorsal margin very broad (fig. 91), and brownish translucent; petiolus rather short (shorter than in *S. unifasciatum* and *S. rufopictum*), first ter-

gite long but not swollen (fig. 93). IFR 0.81—0.88; PTR 0.71—0.75; PR 0.06—0.07; TR 0.15—0.22; SR 0.80—0.95. Male. — In most respects like the female, but clypeus rounded, with small triangular lobes (fig. 89); petiolus long, strongly curved (fig. 90); genitalia (fig. 87, 88) like those of *S. rufopictum*, but more stoutly built, with shorter aedeagus and gonostyles, and more strongly curved digitus, however with the same dense flock of setae laterally on the cuspis. IFR 0.89—0.93; PTR 0.83—0.89; PR 0.08—0.09; TR 0.16—0.17; SR 0.65—0.70.

Coloration. — Sufficiently described by Kohl (1918) after the type of *S. rufipes* Mocsary. Most important traits are the absence of yellow markings on the mesosoma, except for occasional traces of a band on the pronotum; the first and second tergite and the second sternite are reddish, the remaining tergites more or less fuscous apically.

Distribution. — Endemic to the Southern Moluccas (fig. 117).

Material examined. — Ambon. — 1 ♀, Ambon (RMNH); 4 ♀, Ambon, Waai, 1—50 m, 12—26 May 1965, 2 ♀, 1 ♂, Ambon Isl., 70 m, resp. 10 and 26 Nov. and 23 Sep. 1960, 3 ♀, Ambon, 70 m, resp. 22 Jan., 1 April and 7 May 1961, all A. M. R. Wegner (RMNH); 10 ♀ 1 ♂, Ambon, Waai, different dates, A. M. R. Wegner (BPBM).

Ceram. — 1 ♀, West Ceram, April—June 1910, Van Dalen (ZMA).

Sceliphron unifasciatum (Smith)

(figs. 85, 94—95, 117)

Pelopoëus unifasciatus Smith, 1861: 123, ♀ — Batjan, leg. Wallace (OUM; examined); Kohl, 1918: 129 (in synonymy of *S. rufopictum*).

Pelopoëus affinis; Maindron, 1878: 395, pl. IX, fig. 9, ♀ — Halmahera (MNHN) (nec *Spheg affinis* Fabricius, 1793); Kohl, 1918: 129 (doubtful synonym of *S. rufopictum*), 132 (original description).

Sceliphron (Prosceliphron) deforme unifasciatum; Bohart & Menke, 1976: 106.

Type. — There is one specimen of this species in the Saunders-collection (OUM), labelled "Bac" (Batjan) and "*Pelopoëus unifasciatus* Smith" (Smith's handwriting), which I regard as the holotype.

Description. — Body length 18.2—19.5 mm; length of forewing 12.1—13.1 mm. Pubescence: erect pubescence of head and mesosoma purely

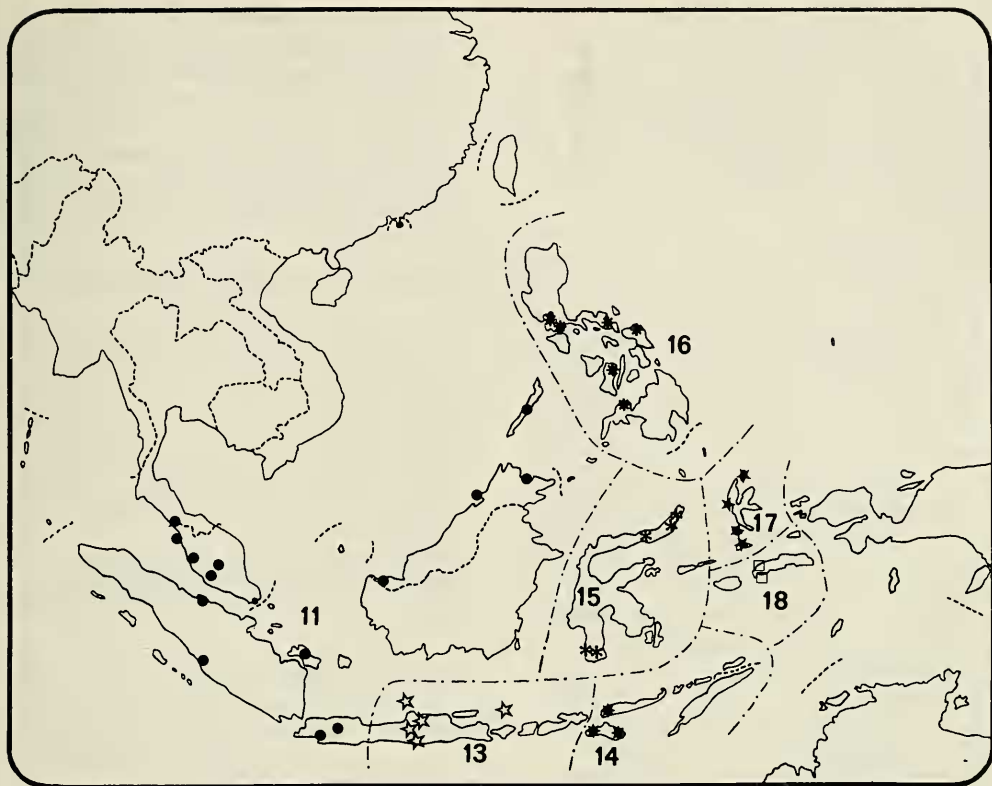


Fig. 117. Distribution of (11) *Sceliphron fervens* (Smith), (13) *S. rufopictum kalshoveni* ssp. n., (14) *S. r. bicinctum* Van der Vecht, (15) *S. r. rufopictum* (Smith), (16) *S. r. laticinctum* ssp. n., (17) *S. murarium* (Smith) and (18) *S. unifasciatum* (Smith).

white, not yellowish as in *S. rufopictum*; facial tomentum silvery.

Morphology. — Clypeus with lateral incisions (cf. fig. 92); post-antennal tubercles very small; vertex not raised; pronotal collar high and narrow in lateral view (fig. 94), medially impressed; mesoscutum sharply transversely striate, laterally with shallow punctation; propodeal orifice more or less rectangular, dorsal margin very broad (like fig. 91); petiolus distinctly curved, longer than in *S. murarium*, first tergite rather long, but not swollen (fig. 95). IFR 0.88–0.90; PTR 0.72–0.78; PR 0.07–0.08; TR 0.17–0.21; SR 0.85–0.93.

Coloration. — Clypeus black or with small yellow spot; pronotum usually with narrow, interrupted yellow band; small subtergular spots present, and usually a small spot on the scutellum; metasoma sometimes with central yellow spot on the first tergite, and usually with band

on the third tergite. There is considerable variation in colour-pattern between the different island-populations; the colour-pattern of a specimen from Morotai is illustrated in fig. 85.

The ♂ of this species is unknown.

Distribution. — Endemic to the Northern Moluccas (fig. 117).

Material examined. — Halmahera. — 1 ♀, Kao Dist., Kampung Toliwang, 1–14 March 1981, A. C. Messer & P. M. Taylor (USNM) (scutellum only with very small spot, first tergite black).

Morotai. — 2 ♀, Morotai, Bernstein (RMNH) (pronotum black, first tergite black (fig. 85)).

Obi. — 2 ♀, W. Obi, Lake Riv., 0–50 m, July–Nov. 1953, A. Wegner (RMNH) (pronotum black, scutellum black, all tergites black).

Sceliphron formosum (Smith)

(figs. 86, 98—113, 118)

Description. — Body length: ♀ 15.4—20.7 mm, ♂ 15.2—18.7 mm; length of forewing: ♀ 10.8—12.7 mm, ♂ 11.0—12.3 mm. Pubescence: erect pubescence of head and mesosoma yellowish, facial tomentum golden.

Morphology: Female. — Clypeus with more or less distinct lateral incisions (figs. 103, 104); post-antennal tubercles variable in size; vertex strongly raised in one subspecies; pronotal collar with median impression, which may be very shallow; mesoscutum transversely striate, but less sharply than in other species, except *S. curvatum*, moreover with distinct punctation between the striae; propodeal orifice with rather broad dorsal margin (figs. 107—109), which is often yellowish or brownish translucent; petiolus distinctly curved, shorter than hind tibia, first tergite short and slender (fig. 110). IFR 0.87—1.05; PTR 0.76—0.88; PR 0.06—0.08; TR 0.15—0.20; SR 0.71—0.88. Male. — Like the female, but clypeus rounded, with hardly a trace of lobes, medially emarginate (figs. 105, 106); petiolus about as long as the hind tibia (figs. 111, 112); genitalia (figs. 98, 99): gonostyles pointed, digitus comparatively long and slender, volsellar plate distinctly triangular. IFR 0.93—1.05; PTR 0.88—1.02; PR 0.08—0.10; TR 0.12—0.18; SR 0.55—0.76.

Distribution. — New Guinea, Bismarck-Archipelago, Solomon Islands, Northern and Eastern Australia (fig. 118).

This species consists of three distinct geographic forms, which differ in colour as well as in some structural details; the large area in which intergradation occurs, however, proves that these forms do not merit specific status. The transitional specimens (from Southern and Eastern New Guinea) are provisionally divided over the subspecies.

Key to the subspecies of *Sceliphron formosum* (Smith)

1. Second tergite black, or with strongly reduced band; usually the sternites are black, the petiolus and the antennal scape yellow; Australia, S. New Guinea *formosum* (Smith)
- All tergites with complete yellow bands; sternites with yellow bands or lateral spots; petiolus usually black; scape dorsally black 2

2. Vertex raised (fig. 100); post-antennal tubercles and tegulae with yellow spot; only first tergite partly red; Bismarck-Archipelago, Solomon-Islands, E. New Guinea *ocellare* Kohl

— Vertex not raised; post-antennal tubercles and tegulae black; often all tergites with reddish ground-colour; N. and W. New Guinea *bruinjii* (Maindron)

Sceliphron formosum bruinjii (Maindron)
(figs. 104, 109, 118)

Pelopoëus bruinjii Maindron, 1878: 394, pl. 9: 10, ♀ — Manokwari ("Dorey") and Anday, New Guinea (MNHN; examined).

Sceliphron bruinjii; Cameron, 1906: 221 (Merauke, Etna Bay); Kohl, 1918: 134.

Sceliphron bruynii Cameron, 1906: 56 (emendation).

Sceliphron (*Pelopoëus*) *fallax* Kohl, 1918: 129, ♀ ♂ — Stephansort, Astrolabe Bay, New Guinea (NMW; examined).

Sceliphron (*Prosceliphron*) *bruinjii*; Van der Vecht & Van Breugel, 1968: figs. 2—4 (genitalia of ♂).

Sceliphron (*Prosceliphron*) *bruinjii*; Bohart & Menke, 1976: 106.

Maindron dedicated this form to Mr. "Bruijn" at Ternate, whose actual name was "De Bruyn". Cameron's emendation however is incorrect, since in the original publication there is no evidence of this error.

Types. — The Paris Museum possesses the two syntypes of *P. bruinjii*. The female with labels "Dorey" and "Raffray & Maindron, Dorey, Nouvelle Guinée" is herewith designated as the lectotype. The paralectotype is labelled "Nouvelle Guinée, Andaie, Mai 1878".

The Vienna Museum possesses three syntypes of *S. fallax*. The lectotype, by present designation, is a female with labels "N. Guinea, Biró 97", "Stephansort, Astrolabe B." and "*Sc. fallax* Kohl". The male paralectotype is labelled equally; the female paralectotype lacks Kohl's identification-label.

Description. — Morphology. — Vertex not or slightly raised; post-antennal tubercles rather large (cf. fig. 101); propodeal orifice often distinctly trapezoidal in outline, with the dorsal margin straight (fig. 109).

Coloration. — Rather variable; the type is a brightly coloured specimen, with large subtegular spots, basal propodeal spots and broad bands on the tergites and sternites; the first and the second tergites are almost entirely reddish. Other specimens, like the type-series of *S. fallax*, are

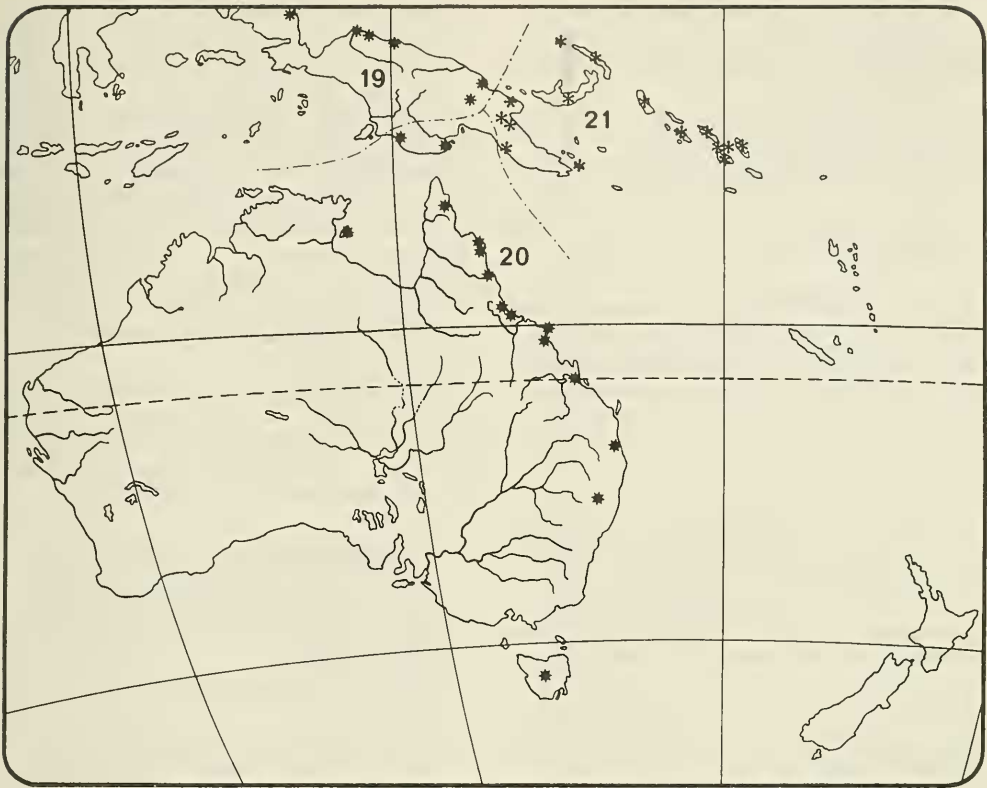


Fig. 118. Distribution of the subspecies of *Sceliphron formosum* (Smith): (19) *S. f. bruinjui* (Maindron), (20) *S. f. formosum* (Smith), and (21) *S. f. ocellare* Kohl.

darker, without subtegular spots, without red parts on the metasoma, and with the bands on the tergites and sternites very narrow.

Material examined. — New Guinea. — 1 ♀, Manokwari, 23 May 1903 (ZMA); 1 ♀, Pionierbivak, July 1920, W. C. van Heurn, 1 ♀, Hat-tam, Utrechts Zendingsgenootschap, 1 ♀, Tami River, Hollandia, 1920, R. Voorhoeve (all RMNH); Ifar, 2 ♀, 1 March 1957, 1 ♀ 2 ♂, 5 Dec. 1956, 1 ♀, 1 Oct. 1958, 1 ♀, 1 March 1959, all J. van den Assem (RMNH); 1 ♀, Humboldt Bay, Hollandia, April 1936, L. E. Cheesman, 1 ♀, Hollandia, Jan. 1937, 300–600 m (BMNH); 1 ♀, Fiume, Purari, Loria, Jan. 1894 (Mus. Genoa); 1 ♀, Dorey, Humboldt Bay, 1906, O. K. Pasteur (MNHN); 1 ♀, Medang Dist., Wanuma, 600–720 m, Aug. 1968, J. Sedlacek (BPBM).

The following specimens are transitional between this subspecies and *S. formosum ocellare*:

New Guinea. — 1 ♀, Kwamkwam, 90 km NW. Finschhafen, 18 Jan. 1973, K. W. Ströder (RMNH); 1 ♀, Wau, Morobe Dist., 1150 m, 17 May 1962, J. Sedlacek (BPBM): these specimens have the vertex slightly raised, the post-antennal tubercles are rather large and marked with yellow, the tegulae bear very small yellow spots, the metasoma however is largely red; 1 ♀, Wau, 1200–1400 m, 18–26 Sep. 1972, J. van der Vecht (RMNH); 1 ♀, Hohola, Pt. Moresby, Central Dist., 30 May 1966, in ornamental garden (RMNH); 1 ♂, Port Moresby, emerged from mud-nest (Australian Museum): these specimens have the vertex slightly raised, the post-antennal tubercles are large, and the tegulae bear small yellow spots; 1 ♀, Bulolo, 700 m, 6 Nov. 1969, J. Sedlacek (BPBM); 1 ♀, Sim-bang, Huon Golf, Biró, 1900 (*Sc. ocellare*, type, det. Kohl) (NMW): like the previous, but with additional yellow spot on the post-antennal tubercles.

Sceliphron formosum formosum (Smith)

(figs. 86, 102—103, 105, 107, 110, 118)

Pelopoeus formosus Smith, 1856: 230, ♀ — Australia (BMNH; examined).*Sceliphron papuanum* Cameron, 1906: 221, ♀ — New Guinea, Merauke (ZMA; examined).*Sceliphron* (*Pelopoeus*) *formosus*; Kohl, 1918: 126—128 (♀ ♂), 138 (original description *S. papuanum*).*Sceliphron* (*Prosceliphron*) *formosum*; Bohart & Menke, 1976: 106.

Type. — The lectotype, by present designation, is a female with labels "Port Essington" and "*formosus* Sm., type" in Smith's handwriting. Another specimen, labelled "type, F. Smith coll. 79—22" is probably not a type-specimen: it does not agree with the description, and may be of a later date.

Description. — Morphology. — Typically the post-antennal tubercles are small (fig. 102), the vertex is not raised, and the clypeus has distinct lateral incisions in the female (fig. 103).

Coloration. — As described by Kohl (1918); the characteristic traits are: post-antennal tubercles black, pronotal band not interrupted, propodeum with yellow spots at apex of dorsal enclosure, petiolus yellow, second and usually third tergite black, sternites 2—5 black (fig. 86).

Variation. — In some N. Australian specimens the petiolus is black, and the sternites bear yellow lateral spots; the spots at apex of the dorsal enclosure may be absent; in the extreme North of Australia the morphology tends to be transitional between *formosum* and *ocellare*: the post-antennal tubercles are larger and the vertex is slightly raised.

Distribution. — Southern New Guinea, Eastern parts of Australia (fig. 118). The occurrence in Tasmania is doubtful. Kohl (1918) mentions also Ceram and Ternate, without reference to specimens or literature, but this is almost certainly incorrect.

Material examined. — Australia. — 1 ♀, S. E. Queensland, 14 Feb. 1957, A. R. Steginga (ZMA); 2 ♀, Australia, Feb. 1847, Vereaux (MNHN); 3 ♀, Tasmania, 1846, Vereaux (MNHN); 1 ♀, Nov. Hollande, Gory (MNHN); 2 ♀, Feb. 1900, R. E. Turner (BMNH); 1 ♀, Stradford, Barron River, 17 Jan. 1972, 1 ♀, Cairns, 30 Jan. 1972, both L. Oosterweghel (RMNH); 1 ♀, Australia boreal (RMNH); 1 ♀, N. S. Wales (RMNH); 2 ♀,

Brisbane, March 1944, E. F. Riek (USNM); 2 ♀, Stradbroke Island, 5 Dec. 1913, 1 ♀, Brisbane, 21 Dec. 1912, both E. F. Riek (USNM); 1 ♀, Halifax, Feb. 1913, Girault, 1 ♀, Cairns, 1 ♀, Sunnybank, 1 Dec. 1951, E. F. Riek (all USNM); 15 ♂ 10 ♀, Mackay, Jan. 1901, R. E. Turner (BMNH); 1 ♀, Townsville, 1 March 1902, F. P. Dodd (BMNH); 2 ♀, Tamworth, 25 Jan. 1960, M. Edwards (BMNH); 2 ♀, Elalie, S. of Elaggy, 9 Nov. 1917, L. Oosterweghel, 1 ♀, Terra van Diemeni, Parzudaki, 1 ♀, Nov. Holl. (all RMNH); 1 ♀, Claudie R., 5 Mls. W. Mt. Lomond, Queensland, 23 Dec. 1971, D. K. McAlpine (USNM).

New Guinea. — 1 ♀, New Guinea Exp. 1905/6, Merauke (ZMA; holotype of *S. papuanum* Cam.); 1 ♀, Eramboe, 80 km ex Merauke, 5 Feb. 1960, T. C. Maa (BPBM); 1 ♀, Pt. More-sby area, May 1947, L. Jones (BMNH).

Sceliphron formosum ocellare Kohl

(figs. 100—101, 106, 108, 111—113, 118)

Sceliphron (*Pelopoeus*) *ocellare* Kohl, 1918: 128, ♀ — Bismarck-Archipelago, Ralum (? ZMB) and Kiningang (? NMW).*Sceliphron* (*Prosceliphron*) *ocellare*; Bohart & Menke, 1976: 106.

Type. — I have seen a specimen labelled by Kohl as "type", but it originates from New Guinea, and thus cannot be considered a type-specimen. No other type-material could be found in the NMW, and neither in the ZMB and TMA.

Description. — Morphology. — Lateral incisions in clypeus of female usually less developed than in other subspecies; post-antennal tubercles rather large (fig. 101); vertex moderately to strongly raised behind anterior ocellus (fig. 100).

Coloration. — As described by Kohl (1918: 128); the diagnostic features are: antennal scape dorsally black, post-antennal tubercles with yellow mark, tegulae with yellow mark, petiolus usually black, tergites with broad bands, sternites with bands or lateral spots.

Variation. — The petiolus and scapes are completely yellow in two males from Manus, which also have the legs nearly entirely yellow; one of these also had a pair of spots at the apex of the dorsal propodeal enclosure. The vertex is extremely swollen in four females from Normanby Island; the coloration is very rich in these specimens, including additional spots

laterally on the pronotum, on the hypo-epimeral area, and sometimes laterally on the mesoscutum.

Material examined. — Admiralty Islands. — 2 ♀, Manus, Lorengau, 17 and 19 June 1962, 2 ♀, Lavongai, Benatam, 19 and 23 March 1962, all Noona Dan Exp. (UZM).

New Britain. — 1 ♂, Rabaul, 1933, J. L. Froggatt (BMNH).

New Ireland. — 1 ♀, Kandan, 25 Dec. 1959, W. W. Brandt (BPBM); 1 ♂, Lemkamin, 16 April 1962, Noona Dan Exp. (UZM).

Normanby Island. — 4 ♀, Wakaiuna, Sewa Bay, 1—8 Jan. 1957, W. W. Brandt (BPBM, RMNH).

New Guinea. — transitional specimens, see under *S. f. bruinjnnii*.

Solomon Islands. — 1 ♀, Small Gela, Balaga, 12—31 Dec. 1963, M. J. A. de Korter, 1 ♀, Guadalcanal, Honiara, Nov. 1967 (both ZMA); 1 ♀, Iles Salom, 1914, E. André (MNHN); 2 ♀, Malaita, Dala, 50 m, 6—8 June 1964, J. & M. Sedlacek (BPBM); 1 ♀, Isabel, Rasa, 11 Dec. 1964, M. McQuillan, 5 ♀ 3 ♂, Guadalcanal, Kukum, 7 Dec. 1961, M. Greenslade, 1 ♀, Bougainville, Oct. 1960, R. W. Paine (all BMNH); 1 ♀, Tulagi, jungle, collecting mud, 16 Dec. 1934, 1 ♀, Tulagi, Sasapi cutting, 25 Dec. 1934, 1 ♀, Sevo Isl., Reko, 23 Feb. 1934, all H. T. Pagden (RMNH); 1 ♀, Bougainville, Kieta, 26 Nov. 1959, T. C. Maa (BPBM).

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INDEX

<i>affinis</i> (Maindron)	254	<i>kalshoveni</i> ssp. n.	249
<i>atripes</i> (F. Morawitz)	240	<i>koreanum</i> Uchida	240
<i>bicinctum</i> Van der Vecht	249	<i>laticinctum</i> ssp. n.	252
<i>bruinjnii</i> (Maindron)	256	<i>lineatipes</i> Cameron	234
<i>bruynii</i> Cameron	256	<i>mocsaryi</i> Dalla Torre	254
<i>coromandelicum</i> (Lepeletier)	243	<i>murarium</i> (Smith)	254
<i>curvatum</i> (Smith)	228	<i>nipponicum</i> Tsuneki	240
<i>deforme</i> (Smith)	230, 236	<i>ocellare</i> Kohl	258
<i>fallax</i> Kohl	256	<i>papuanum</i> Cameron	258
<i>femorale</i> ssp. n.	236	<i>pulchellum</i> Gussakovskij	228
<i>fervens</i> (Smith)	242	<i>rectum</i> Kohl	228
<i>flavofasciatum</i> (Smith)	249	<i>rufipes</i> (Mocsary)	254
<i>formosum</i> (Smith)	255, 258	<i>rufopictum</i> (Smith)	247, 249
<i>funestum</i> Kohl	226	<i>shestakovi</i> Gussakovskij	224
<i>japonicum</i>	240	<i>taiwanum</i> Tsuneki	238
		<i>tibiale</i> Cameron	234
		<i>unifasciatum</i> (Smith)	254